

**MPA | Eberswalde**

Materialprüfanstalt  
Brandenburg GmbH

Prüfung, Überwachung,  
Zertifizierung, Gutachten,  
Forschung und Entwicklung

# Test Report

**Nr. 31/21/4350/02  
in two copies**

Alfred-Möller-Straße 1, H 13  
D-16225 Eberswalde

Fon +49 (0) 33 34. 65 560  
Fax +49 (0) 33 34. 65 550

www.mpaew.de  
office@mpaew.de

**Manufacturer:** KNAUF GYPSOPIIA A.B.E.E.  
Euripidou Str. 10  
17674 Kalithea, Athens  
Greece

(manufacturing plant:  
Gypsum Products Industry  
30500 Stanos, Amfilochia, Greece)

Geschäftsführer:  
Dr. Peter Schumacher

HRB 10408 FF

**Applied test procedure:** Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air (EN 16516);  
Determination of the emission of volatile organic compounds (VOC) and Formaldehyde from construction products – Emission test chamber method;  
assessment according to German AgBB-scheme (Committee of Health-related evaluation of construction products), according to French regulations “decret n° 2011-321 du 23 mars 2011” and “arrête du 19 avril 2011” and Classification in the EMICODE system

**Date of order:** 22.04.2021

**Received:** 22.04.2021

**Test product:** **GKF – fire resistant gypsum board 12,5 mm**

**Samples received:** 27.04.2021

**Persons in charge:** M.Sc. J. Murr, Dr. R. Wegner

**Period of testing:** 5-6/2021

This test report comprises 12 pages. It refers exclusively to the material submitted for testing and remains property of MPA until completion of full payment. The test material is being stored until 10/2021. Publication of test reports is only permissible if published as a whole. Publication of excerpts, references to tests for purposes of advertising and the use of contents of test reports require in every single case the revocable written consent of MPA.

**1. Test material and sampling**

Product: **GKF – fire resistant gypsum board 12,5 mm**

Sample: 3 panel segments a 500 mm x 500 mm x 12,5 mm

Sampling: 16.04.2021 by manufacturer (sampling report is shown below)

Packaging: wrapped in plastic foil

Storage conditions: room temperature, light protected area

4 350 102

<b>Qualitäts- Management- System</b>	<b>MPA Eberswalde</b>	Code:
	Materialprüfanstalt Brandenburg GmbH	Ausgabe: 1
	<b>Zertifizierungsanweisung</b>	Datum: 14.02.2018
	<b>Sampling report (EN 16516)</b>	Seite 1 von 1

**EN 16516** – Construction products: Assessment of release of dangerous substances (VOC)

Testing laboratory / certification body: <b>MPA Eberswalde (NB 0763)</b>	Sampler (name, company, telephone): <i>Evanthia Vasileiou Knauf Gyroptika ABEE 26420 39100</i>	
Name of the manufacturer at the place of sampling (address/stamp): <b>KNAUF GYPSOPTIKA A.B.E.E. GYPSUM PRODUCTS INDUSTRY FACTORY STANOS AMFILOCHIA 30500 V.A.T.: EL - 094133921 TEL: +30 2642029100 - FAX: +30 2642029112</b>	Manufacturer (if deviating from company's name at the place of sampling):	
Name of the product: <i>GKF - fire resistant gypsum 12,5 mm board</i>	Type of product (e.g. laminate, textile flooring, PVC-flooring): <i>Plasterboard</i>	
Model/program/series:	Batch No:	
Article No:	Date of batch production:	
Misc.:	<i>21/03/21 23:02</i>	
Sample is taken from <input type="radio"/> Production <input checked="" type="radio"/> Store <input type="radio"/> Miscellaneous Place of storage: <i>Warehouse</i>	How had the product been stored prior to sampling?	<input type="radio"/> open <input checked="" type="radio"/> in the stack <input type="radio"/> wrapped up Packing material:
Specifics (possible negative influences by emission at the place of taking the sample, petrol emissions, solvent emissions from production, uncertainties, questions, etc.):		
Cut edges (identification of cut edges when present and identification of new surfaces and surface to be exposed in the emission test):		
<b>Confirmation:</b> The signer herewith confirms the correctness of the data given above. The sample was selected, drawn and packed personally in accordance with the instructions for the taking of samples.		
Date of sampling: <i>16/04/2021</i>	Signature: (Stamp) <b>KNAUF GYPSOPTIKA A.B.E.E. GYPSUM PRODUCTS INDUSTRY FACTORY STANOS AMFILOCHIA 30500 V.A.T.: EL - 094133921 TEL: +30 2642029100 - FAX: +30 2642029112</b>	

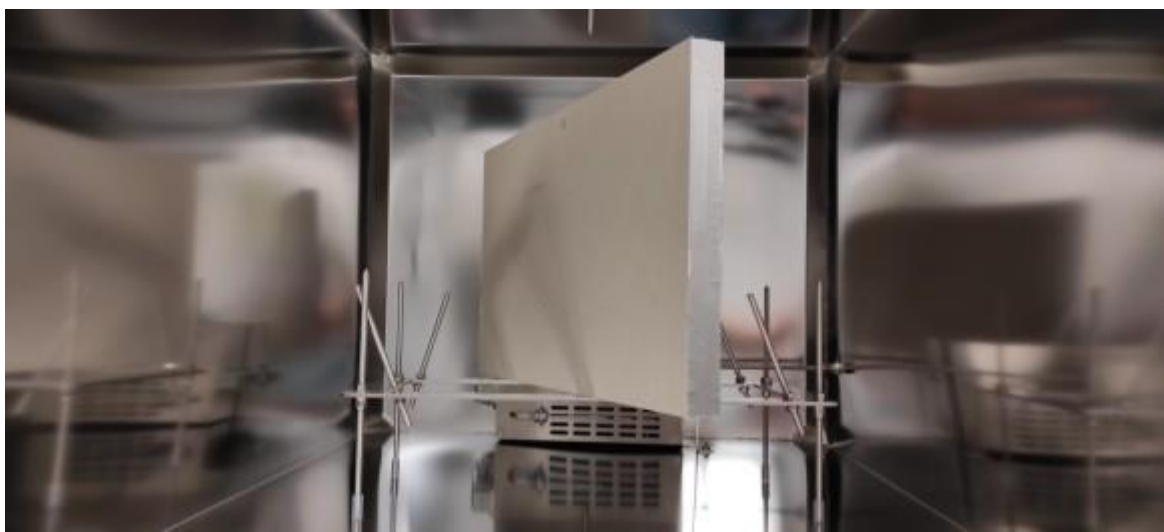
Diese QMD ist vertraulich zu behandeln und darf ohne ausdrückliche schriftliche Genehmigung der herausgebenden Stelle weder ganz noch teilweise vervielfältigt werden.

## **2. Test specimen**

Dimension:	450 mm x 250 mm; back to back storage of 2 specimens, with edges covered with glass and low emission aluminium tape
Thickness:	25 mm (2 x 12,5 mm)
Area weight:	10179 g/m <sup>2</sup>
Date of preparation of test specimen:	07.05.2021 (cutting)

## **3. Chamber test**

Chamber (volume/material):	0,225 m <sup>3</sup> (stainless steel/glass)
Area of test specimen:	0,225 m <sup>2</sup>
Loading factor:	1,0 m <sup>2</sup> /m <sup>3</sup> (required for wall materials in reference room)
Temperature:	23 °C (± 1 K)
Relative humidity:	50 % (± 3 %)
Air exchange rate:	0,5 AC/h (± 0,05 AC/h)
Start of testing (placing of test specimen):	07.05.2021



test specimen in chamber

**4. Analysis**

Parameter:	VOC resp. Formaldehyde and other Aldehydes
Analytical laboratory:	Labor Friedle GmbH, Tegernheim (DAkkS; D-PL-14646-03-00) resp. MPA Eberswalde
Method:	GC-MS after adsorption on Tenax and thermodesorption with cryofocussing resp. HPLC-UV after chemisorption on DNPH-cartridge and elution with Acetonitrile (DIN EN ISO 16000-3)
Sampling volume:	2 L resp. 50 L
First and second sampling:	after 3 and 28 days
Parameter:	ammonia
Method:	Photometry after adsorption in 0,05 N sulfuric acid (method acc. to DIBt-laboratory manual – Analysenmethode 2 resp. EN 16516:2017+A1:2020 subclause 8.4)
Sampling volume:	180 L
sampling:	28 days

**5. Test results****5.1. VOC/VVOC after 3 days**

Compound	Retention Range	CAS No.	C [µg/m <sup>3</sup> ] *	C_tol [µg/m <sup>3</sup> ] **	NIK ***	R-value ****
formaldehyde	VVOC	50-00-0	9		100	0,090
acetaldehyde	VVOC	75-07-0	5		300	0,017
hexanal	VOC	66-25-1	2	1	900	0,002
octanal	VOC	124-13-0	2	1	900	0,002
nonanal	VOC	124-19-6	1	1	900	0,001
benzaldehyde	VOC	100-52-7	2	2	90	0,022
decane	VOC	124-18-5	2	1	6000	0,000
undecane	VOC	1120-21-4	1	1	6000	0,000
dodecane	VOC	112-40-3	4	5	6000	0,002
1-dodecene	VOC	112-41-4	2	2	750	0,003
1-octanol	VOC	111-87-5	2	1	1700	0,001
toluene	VOC	108-88-3	2	2	2900	0,001
1-butyl acetate	VOC	123-86-4	3	2	4800	0,001
2-methoxy-1-methylethyl acetate	VOC	108-65-6	5	2	650	0,008
acetone	VVOC	67-64-1	10		120000	0,000
ethyl methyl ketone	VOC	78-93-3	2	1	20000	0,000
methyl isobutyl ketone	VOC	108-10-1	20	15	1000	0,035
Trimethylsilanol	VOC			12		
Cyclohexanon	VOC	108-94-1	4	2	410	0,010
1-Chloroctan	VOC			8		
1-Chlordekan	VOC			9		
not identified VOC-cluster	VOC			22		

\* emission test chamber concentration of a specific VVOC, VOC or SVOC

\*\* emission test chamber concentration as toluene equivalent

\*\*\* lowest concentration of interest acc. to AgBB 2021

\*\*\*\* ratio of concentration of compound / NIK (LCI)

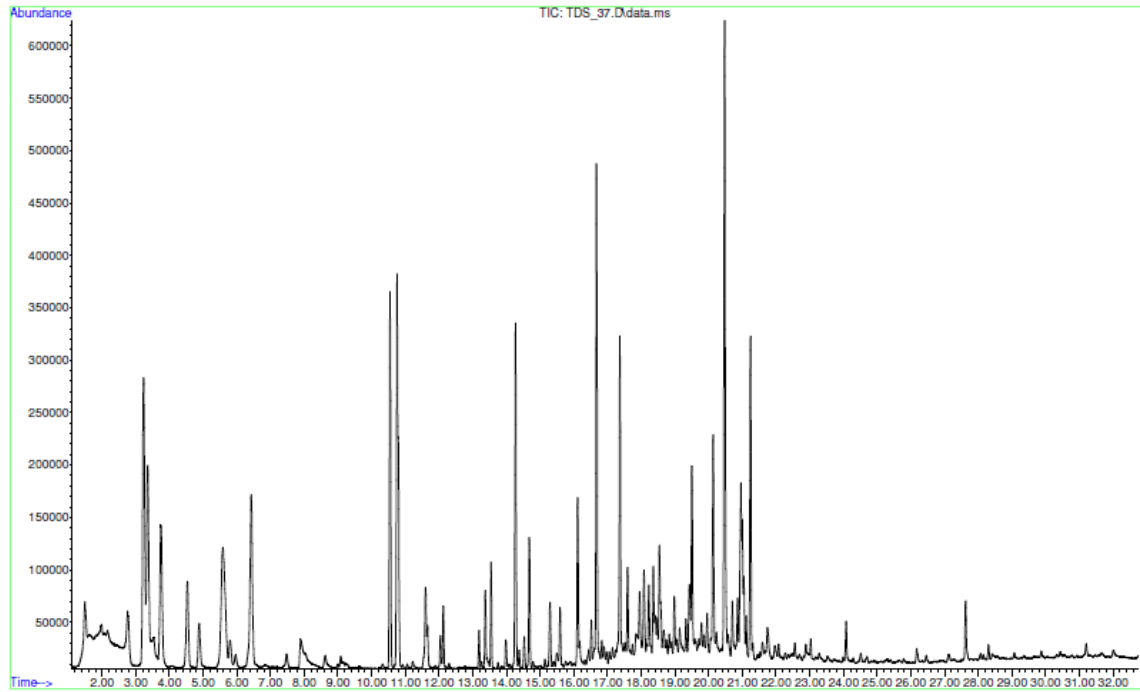
	Concentration after 3 days [µg/m <sup>3</sup> ]	SER <sub>a</sub> [µg/m <sup>2</sup> h] *
TVOC **	76	38
TSVOC ***	< 5	< 2,5
Volatile carcinogens of act. CARC 1A and CARC 1B	< 1	< 0,5
Formaldehyde	9	4,5

\* specific emission rate related to area

\*\* total volatile organic compounds (sum of concentrations of VOC)

\*\*\* total semi-volatile organic compounds (sum of concentrations of SVOC)

File :C:\msdchem\1\DATAMS6\2021\05-Mai\TDS\1705\TDS\_37.D  
Operator : WM/BW  
Acquired : 19 May 2021 14:46 using AcqMethod VOC\_TDS\_neu.M  
Instrument : GC-MS VI  
Sample Name: K00045, I21-051184-01  
Misc Info : 2,0L Luft HI + Gips-Platte + 25ng ISTD  
Vial Number: 4



Chromatogram

## 5.2. VOC/VVOC after 28 days

Compound	Retention Range	CAS No.	C [µg/m³] *	C_tol [µg/m³] **	NIK ***	R-value ****
formaldehyde	VVOC	50-00-0	3		100	0,030
butanal	VVOC	123-72-8	1		650	0,002
nonanal	VOC	124-19-6	2	2	900	0,002
1-octanol	VOC	111-87-5	3	2	1700	0,002
acetic acid	VOC	64-19-7	15	4	1200	0,013
2-methoxy-1-methylethyl acetate	VOC	108-65-6	2	1	650	0,003
1-Chloroctan	VOC			4		
1-Chlordekan	VOC			10		
not identified VOC-cluster	VOC			21		

\* emission test chamber concentration of a specific VVOC, VOC or SVOC

\*\* emission test chamber concentration as toluene equivalent

\*\*\* lowest concentration of interest acc. to AgBB 2021

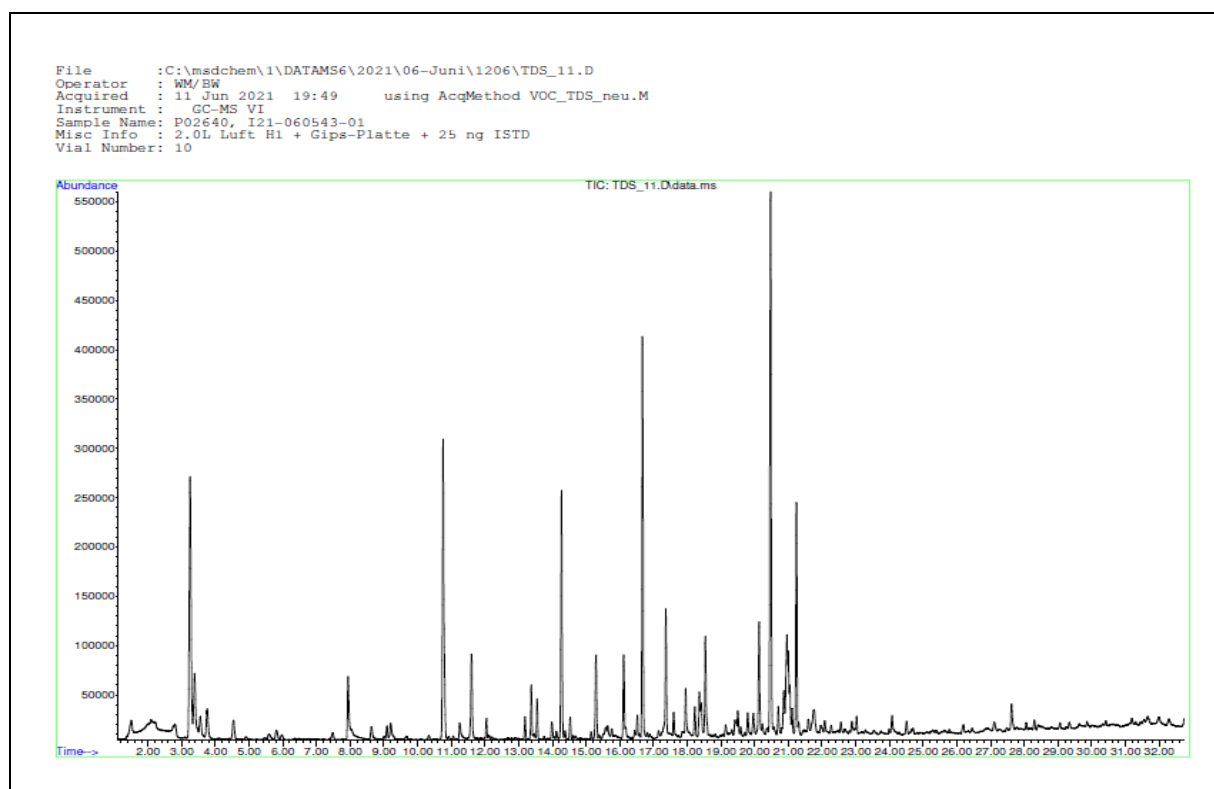
\*\*\*\* ratio of concentration of compound / NIK (LCI)

	Concentration after 28 days [µg/m³]	SER <sub>a</sub> [µg/m²h] **
TVOC **	46	23
TSVOC ***	< 5	< 2,5
Volatile carcinogens of act. CARC 1A and CARC 1B	< 1	< 0,5
Formaldehyde	3	1,5
ammonia	< 20	< 10

\* specific emission rate related to area

\*\* total volatile organic compounds (sum of concentrations of VOC)

\*\*\* total semi-volatile organic compounds (sum of concentrations of SVOC)



Chromatogram

**6. Assessment****6.1. Assessment according to German AgBB-scheme**

The following requirements served as basis for testing and assessment:

- DIBt-guideline for health assessment of construction products used in interiors
- LCI (NIK) list of AgBB (Lowest concentration of interest; 2021)

Parameter	Test results (3 days)	AgBB-requirements	AgBB-requirements fulfilled
TVOC	0,076 mg/m <sup>3</sup>	≤ 10 mg/m <sup>3</sup>	yes
Σ SVOC	< 0,005 mg/m <sup>3</sup>	-	-
R	0,149	-	-
Σ VOC without LCI	0,051 mg/m <sup>3</sup>	-	-
Σ Cancerogene	< 1 µg/m <sup>3</sup>	≤ 10 µg/m <sup>3</sup>	yes
Formaldehyde	0,009 mg/m <sup>3</sup>	-	-

Parameter	Test results (28 days)	AgBB-requirements	AgBB-requirements fulfilled
TVOC	0,046 mg/m <sup>3</sup>	≤ 1 mg/m <sup>3</sup>	yes
Σ SVOC	< 0,005 mg/m <sup>3</sup>	≤ 0,1 mg/m <sup>3</sup>	yes
R-value	0,013	≤ 1	yes
Σ VOC without LCI	0,031 mg/m <sup>3</sup>	≤ 0,1 mg/m <sup>3</sup>	yes
Σ Cancerogene	< 1 µg/m <sup>3</sup>	≤ 1 µg/m <sup>3</sup>	yes
Formaldehyde	0,003 mg/m <sup>3</sup>	≤ 0,120 mg/m <sup>3</sup>	yes

The tested product complies with the requirements of AgBB-scheme for emissions after 28 days in the chamber, at a loading 1 m<sup>2</sup>/m<sup>3</sup>. This corresponds to the required loading for construction products for walls and an air exchange rate of 0,5 h<sup>-1</sup>.



## 6.2. Assessment according to French VOC-Regulation

The following requirements served as basis for testing and assessment:

- French mandatory labelling system – VOC-emission classes (acc. to Decree n°2011-321 of March 23, 2011 and order of April 19, 2011)

Compound / Parameter	Emission classes [µg/m <sup>3</sup> ]			
	<b>C</b>	<b>B</b>	<b>A</b>	<b>A+</b>
Formaldehyde	> 120	< 120	< 60	< 10
Acetaldehyde	> 400	< 400	< 300	< 200
Toluene	> 600	< 600	< 450	< 300
Tetrachloroethylene	> 500	< 500	< 350	< 250
Xylene	> 400	< 400	< 300	< 200
1,2,4-Trichlorobenzene	> 2000	< 2000	< 1500	< 1000
1,4-Dichlorobenzene	> 120	< 120	< 90	< 60
Ethylbenzene	> 1500	< 1500	< 1000	< 750
2-Butoxyethanol	> 2000	< 2000	< 1500	< 1000
Styrene	> 500	< 500	< 350	< 250
TVOC	> 2000	< 2000	< 1500	< 1000

The emission results for 28 day sampling are shown below:

Parameter	Analytical results (28 days) [µg/m <sup>3</sup> ]	Emission class
Formaldehyde	3	A+
Acetaldehyde	<2	A+
Toluene	<1	A+
Tetrachloroethylene	<1	A+
Xylene	<1	A+
1,2,4-Trichlorobenzene	<1	A+
1,4-Dichlorobenzene	<1	A+
Ethylbenzene	<1	A+
2-Butoxyethanol	<1	A+
Styrene	<1	A+
TVOC*	31	A+

\* TVOC<sub>MS</sub> as toluene equivalent

CMR substances (especially Trichlorebenzene, benzene, DEHP and DBP; listed in orders of April 30, 2009 and May 28, 2009) were not detectable.

The tested product complies with the requirements of French emission **class A+** regarding emission after 28 days in the chamber, tested as material for walls (loading 1 m<sup>2</sup>/m<sup>3</sup>).

### 6.3. Assessment according to Belgian VOC regulation

The following requirements served as basis for testing and assessment:

- "Königlicher Erlass zur Festlegung der Schwellenwerte für Innenraumemissionen aus Bauprodukten für bestimmte Verwendungszwecke" (08.05.2014)

Parameter	Analytical results (28 days)	requirements	requirements fulfilled [yes/no]
TVOC	0,046 mg/m <sup>3</sup>	≤ 1 mg/m <sup>3</sup>	yes
Σ SVOC	< 0,005 mg/m <sup>3</sup>	≤ 0,1 mg/m <sup>3</sup>	yes
R-Wert	0,013	≤ 1	yes
Σ VOC ohne NIK	0,031 mg/m <sup>3</sup>	≤ 0,1 mg/m <sup>3</sup>	yes
Σ Cancerogene	< 1 µg/m <sup>3</sup>	≤ 1 µg/m <sup>3</sup>	yes
Toluene	< 0,001 mg/m <sup>3</sup>	≤ 0,30 mg/m <sup>3</sup>	yes
Acetaldehyde	< 0,002 mg/m <sup>3</sup>	≤ 0,20 mg/m <sup>3</sup>	yes
Formaldehyde	0,003 mg/m <sup>3</sup>	≤ 0,10 mg/m <sup>3</sup>	yes

The tested product complies with the requirements of Belgian VOC regulation regarding emission after 28 days in the chamber, at a loading 1 m<sup>2</sup>/m<sup>3</sup>. This corresponds to the required loading for construction products for walls and an air exchange rate of 0,5 h<sup>-1</sup>.

### 6.4. Assessment according to Finnish emission classification system

The following requirements served as basis for testing and assessment:

- M1 Emission Classification of Building Materials: Protocol for Chemical and Sensory Testing of Building Materials (2017)

Parameter	Analytical results (28 days)	<b>M1</b> requirements	requirements fulfilled [yes/no]
TVOC [mg/m <sup>2</sup> h]	0,023	< 0,2	yes
VOC with EU-LCI [µg/m <sup>3</sup> ]	< EU-LCI	≤ EU-LCI	yes
Formaldehyde [mg/m <sup>2</sup> h]	0,002	< 0,05	yes
Ammonia [mg/m <sup>2</sup> h]	< 0,01	< 0,03	yes
Σ Cancerogene [mg/m <sup>3</sup> ]	< 0,001	< 0,001	yes

The tested product complies with the requirements of Finnish emission **class M1** regarding emission after 28 days in the chamber, at a loading 1 m<sup>2</sup>/m<sup>3</sup>. This corresponds to the required loading for construction products for walls and an air exchange rate of 0,5 h<sup>-1</sup>.

6.5. Classification in the EMICODE-system

The following requirements served as basis for testing and assessment:

- GEV – testing method; Determination of Volatile Organic Compounds for Classification in the EMICODE system (30.10.2019)
- Requirements for Emission Controlled Installation Products, Adhesives and Building Materials and Award of the EMICODE (27.04.2020)

Parameter	Test results <b>(3 days)</b>	EMICODE EC 1 <sup>Plus</sup>	EMICODE EC 1	EMICODE EC 2
TVOC <sub>TE</sub>	71 µg/m <sup>3</sup>	≤ 750 µg/m <sup>3</sup>	≤ 1000 µg/m <sup>3</sup>	≤ 3000 µg/m <sup>3</sup>
Σ Cancerogene	< 1 µg/m <sup>3</sup>	≤ 10 µg/m <sup>3</sup>	≤ 10 µg/m <sup>3</sup>	≤ 10 µg/m <sup>3</sup>
Formaldehyde	9 µg/m <sup>3</sup>	≤ 50 µg/m <sup>3</sup>	≤ 50 µg/m <sup>3</sup>	≤ 50 µg/m <sup>3</sup>
Acetaldehyde	5 µg/m <sup>3</sup>	≤ 50 µg/m <sup>3</sup>	≤ 50 µg/m <sup>3</sup>	≤ 50 µg/m <sup>3</sup>
Σ formaldehyde / acetaldehyde	14 µg/m <sup>3</sup>	≤ 0,05 ppm	≤ 0,05 ppm	≤ 0,05 ppm

Parameter	Test results <b>(28 days)</b>	EMICODE EC 1 <sup>Plus</sup>	EMICODE EC 1	EMICODE EC 2
TVOC <sub>TE</sub>	31 µg/m <sup>3</sup>	≤ 60 µg/m <sup>3</sup>	≤ 100 µg/m <sup>3</sup>	≤ 300 µg/m <sup>3</sup>
Σ SVOC <sub>TE</sub>	< 5 µg/m <sup>3</sup>	≤ 40 µg/m <sup>3</sup>	≤ 50 µg/m <sup>3</sup>	≤ 100 µg/m <sup>3</sup>
R-value	< 0,005	≤ 1	-	-
Σ VOC without NIK	31 µg/m <sup>3</sup>	≤ 40 µg/m <sup>3</sup>	-	-
Σ Cancerogene	< 1 µg/m <sup>3</sup>	≤ 1 µg/m <sup>3</sup>	≤ 1 µg/m <sup>3</sup>	≤ 1 µg/m <sup>3</sup>
Formaldehyde	3 µg/m <sup>3</sup>			
Acetaldehyde	< 2 µg/m <sup>3</sup>			
Σ formaldehyde / acetaldehyde	3 µg/m <sup>3</sup>			

The tested product complies with the requirements of EMICODE EC 1<sup>PLUS</sup> for emissions after 3 and 28 days in the chamber, at a loading 1,0 m<sup>2</sup>/m<sup>3</sup>. This corresponds to the required loading for construction products for walls and an air exchange rate of 0,5 h<sup>-1</sup>.

6.6. Assessment according to LEED v4.1 (projects outside of the U.S.)

According to LEED v4.1 Building Design and Construction (April 2021) e.g. the following certifications and programs for evaluation of VOC emissions using EN 16516 are identified to meet the low-emitting materials credit criteria requirements (clause: low-emitting materials - international tips):

- Blue Angel (if formaldehyde limit of 10 micrograms per cubic meter after 28 days is also met)
- EMICODE EC1 (if formaldehyde limit of 10 micrograms per cubic meter after 28 days is also met. EMICODE has formaldehyde limit of 50 µg/m<sup>3</sup> after 3 days)
- EMICODE EC1<sup>PLUS</sup> (Additional information regarding the formaldehyde limit at 28 days is not required for products meeting EMICODE EC1plus)
- Finnish Emission Classification of Building Materials (M1)

Parameter	Emission results (28 Tage)	Low-emitting criteria	Compliant [yes/no]
Formaldehyde	3	≤ 10 µg/m <sup>3</sup>	yes

VOC-emission certification / program	VOC-emission of test product compliant [yes/no]
Blue Angel	- *
EMICODE EC1	yes
EMICODE EC1 <sup>PLUS</sup>	yes
Finnish Emission Classification of Building Materials (M1)	yes

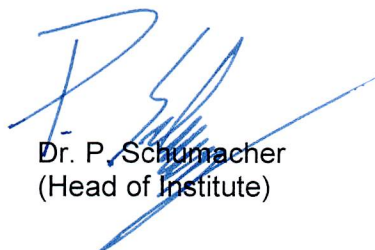
\* product type outside of scope

The tested product complies with the requirements of LEED v4.1 for low-emitting materials at a loading 1,0 m<sup>2</sup>/m<sup>3</sup>. This corresponds to the required loading for construction products for walls and an air exchange rate of 0,5 h<sup>-1</sup>.

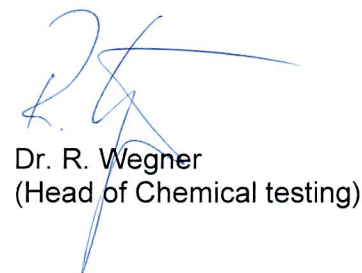
NOTE: The test results refer exclusively to the material delivered for testing.

**MPA Eberswalde**  
**Materialprüfanstalt Brandenburg GmbH**  
- Holz und Holzschutz -

Eberswalde, 28.06.2021

  
Dr. P. Schumacher  
(Head of Institute)



  
Dr. R. Wegner  
(Head of Chemical testing)