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EMISSION MEASUREMENTS FOR THE FINNISH CLASSIFICATION OF BUILDING MATERIALS

1 Sample Information

Sample name	Woodio Wall 120
Batch no.	-
Production date	28.1.2021
Product type	Interior cladding panel
Sample reception	15.2.2021

2 Brief Evaluation of the Results

2.1 Comparison with M1 Limit Values

Parameter	Area specific emission rate	Limit Value
TVOC [mg/(m ² h)]	0.061	< 0.2
Formaldehyde [mg/(m ² h)]	0.011	< 0.05
Ammonia [mg/(m ² h)]	< 0.002	< 0.03
Total CMR [mg/m ³]	< 0.001	< 0.001
Single VOCs with EU-LCI [mg/m ³]	Complies	≤ EU-LCI
Odour (dimensionless)	+ 0.2	≥ 0.0

Full details based on the testing and direct comparison with limit values are available in the following pages

Espoo, 13.4.2021



Hanna Kajander
Expert

Distribution Customer

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3 Applied Test Methods

3.1 Specific Laboratory Sampling and Analyses

Procedure	External Method	Quantification limit / sampling volume	Analytical principle	Combined Uncertainty [RSD (%)]
Sample preparation	M1 testing protocol /1/	-	-	-
Emission chamber testing	EN 16516 /2/, ISO 16000-9 /3/	-	Chamber and air control	-
Sampling of VOC	EN 16516 /2/, ISO 16000-6 /4/	1.5-5 L	Tenax TA	-
Analysis of VOC	EN 16516 /2/, ISO 16000-6 /4/	1 µg/m ³	TD-GC/MS	±25%
Sampling of formaldehydes*	In-house method /6/, EN 717-1 /7/	200-400 L	H ₂ SO ₄ solution	-
Analysis of formaldehydes*	In-house method /6/, EN 717-1 /7/	5 µg/m ³	Spectrophotometry	±23%
Sampling of Ammonia	In-house method /8/	200-400 L	H ₂ SO ₄ solution	-
Analysis of Ammonia	In-house method /8/	5 µg/m ³	Spectrophotometry	±33%
Odour/sensory testing*	ISO 16000-28 /9/	-	Odour panel	-

4 Sample Preparation, Test Parameters and Deviations

4.1 Sample Information and Preparation of the Test Specimen

Parameter	Value
Product type	interior cladding panel
Product name	Woodio Wall 120
Batch number	-
Production date	28.1.2021
Sending date	-
Sample received	15.2.2021
Packaging /transport	aluminium foil and plastic wrapping / by customer
Sample description	solid wood composite
Test specimen preparation	reverse side and edges sealed
Test period started, date	17.2.2021
Emission sampling, date	17.3.2021
Sensory evaluation, date	17.3.2021

4.2 Emission Chamber Test Parameters

Parameter	Value	Parameter	Value
Chamber volume, V[m ³]	0.12	Test period	28 d
Air Change rate, n[h ⁻¹]	0.5	Area specific ventilation rate, q [m/h or m ³ /m ² h]	0.50
Relative humidity of supply air, RH [%]	50 ± 5	Loading factor [m ² /m ³]	1.0
Temperature of supply air, T [°C]	23 ± 1	Test scenario	Wall

4.3 Deviations from Referenced Protocols and Regulations

No deviations from the referenced test methods were observed.

4.4 Picture of Sample

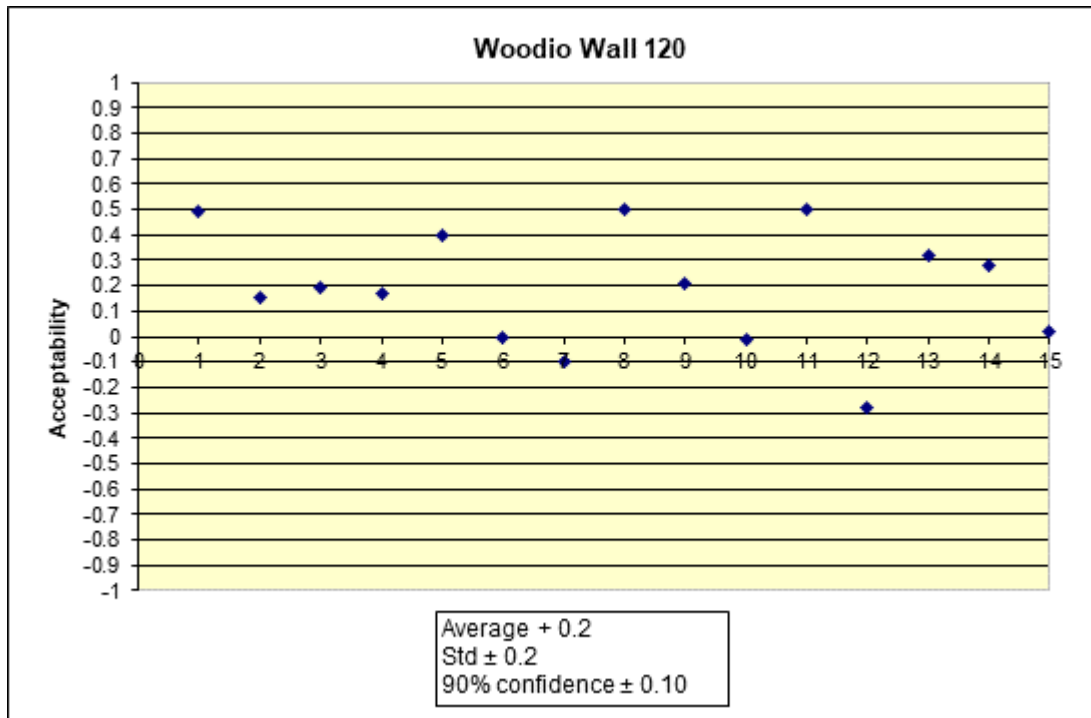


5 Results

5.1 Emission Test Results after 28 Days

	CAS No.	Retention time	ID-Cat	Toluene eq.	Toluene SER	Specific Conc.	SER	EU-LCI
		[min]		[$\mu\text{g}/\text{m}^3$]	[$\mu\text{g}/(\text{m}^2\cdot\text{h})$]	[$\mu\text{g}/\text{m}^3$]	[$\mu\text{g}/(\text{m}^2\cdot\text{h})$]	[$\mu\text{g}/\text{m}^3$]
VOC compounds								
Acetic acid ^a	64-19-7	5.31	1	< 5	< 2	29	14	1200
2-Butanone	78-93-3	5.62	1	12	6	48	23	20000
Ethyl acetate	141-78-6	6.05	2	< 5	< 2			
Methyl methacrylate	80-62-6	9.09	1	5	2	21	10	750
Propylene glycol	57-55-6	9.98	1	< 5	< 2	12	6	2100
Cyclotrisiloxane, hexamethyl-	541-05-9	13.19	2	< 5	< 2			
4-Hydroxy-4-methyl-pentane-2-on (diacetone alcohol)	123-42-2	14.03	1	< 5	< 2	11	5	960
Styrene	100-42-5	15.99	1	53	25	61	29	250
Benzaldehyde	100-52-7	18.49	2	32	15			
Benzene, 1,3,5-trimethyl-	108-67-8	18.74	1	< 5	< 2	< 5	< 2	450
Phenol	000108-95-2	18.85	2	< 5	< 2			
Cyclotetrasiloxane, octamethyl-	556-67-2	19.30	1	< 5	< 2	< 5	< 2	1200
Benzene, 1,2,4-trimethyl-	95-63-6	19.62	1	< 5	< 2	< 5	< 2	450
Benzyl alcohol	100-51-6	20.83	1	< 5	< 2	< 5	< 2	440
Benzeneacetaldehyde	122-78-1	21.24	2	< 5	< 2			
Acetophenone	98-86-2	21.98	1	< 5	< 2	< 5	< 2	490
Phenylglyoxal	1074-12-0	22.15	2	< 5	< 2			
Cyclopentasiloxane, decamethyl-	541-02-6	24.06	2	< 5	< 2			
Benzoic acid	65-85-0	24.45	2	< 5	< 2			
2-methyl-propanoic acid, 2,2-dimethyl-1-(1-methylethyl)-1,3-propanediyl ester (TXIB)	6846-50-0	35.53	1	27	13	22	11	450
TVOC				130	61			
VVOC compounds								
None determined								
TVVOC				< 5	< 2			
SVOC compounds								
None determined								
TSVOC				< 5	< 2			
CMR substances								
None determined								
Total CMR				< 1	< 1	< 1	< 1	
Formaldehyde	50-00-0		1			23	11	100
Ammonia	7664-41-7		1			< 5	< 2	

5.2 Sensory Testing



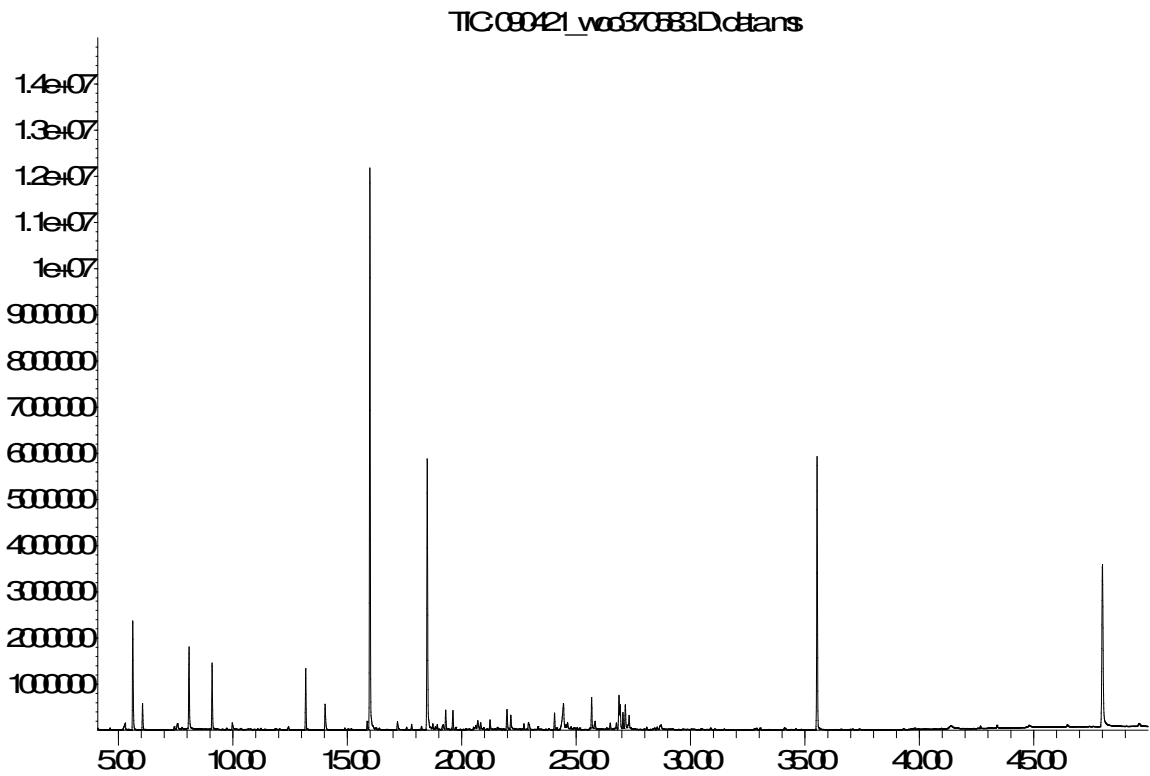
6 General Test References

1. Protocol for Chemical and Sensory Testing of Building Materials. Version 15.11.2017 (<https://cer.rts.fi/en/m1-emission-class-for-building-material/>)
2. EN 16516 Construction products: Assessment of release of dangerous substances. Determination of emissions into indoor air.
3. ISO 16000-9 Determination of the emission of volatile organic compounds from building products and furnishing. Emission test chamber method.
4. ISO 16000-6 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 or MS-FID.
5. EU-LCI VOC-compound emission https://ec.europa.eu/growth/sectors/construction/eu-lci/values_en
6. EN 717-1. Wood based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method.
7. In-house method. Determination of formaldehyde using spectrometric acetyl acetone -method.
8. In-house method. Determination of ammonium concentration with ammonium cell test.
9. ISO 16000-28 Determination of odour emissions from building products using test chambers.

7 Appendices

7.1 Chromatogram

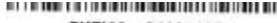
Abundance



Time->


7.2 Sampling Report

Eurofins Expert Services


 EUFI29-21001127

Sample information: M1-testing

Notice: This report will be attached to the official test report as an appendix

Customer name and Invoicing address/ Contact person Woodio Oy Karkkaku 2C 00530 Hki Robert Holmberg, 050 4411000	Producer contact information
Product name Woodio Wall 120	Product type WALL / Panel
Date of production 28.1.2021	Batch number
Date of sampling 2.2.2021	Amount of sample 1
The sample has been taken from production line <input checked="" type="checkbox"/> storage <input type="checkbox"/> other <input type="checkbox"/> please, specify:	How was the sample stored before sampling?
If taken from a larger lot, please describe how sample was taken	
Other remarks	
Packaging: Solid samples can be packaged by wrapping airtight in aluminium foil and then packaged in an unprinted airtight polyethylene bag and sealed. As an alternative, aluminium-coated packaging material may be used. To prevent external contamination, the package should be sealed maximally airtight with a film welding device, or with a low emission adhesive tape, or by mechanical tightening.	
Confirmation I confirm that the sample has been chosen, sampled and packaged according to instructions in the M1 testing protocol (Version 15 th November 2017): http://m1.rts.fi/system/resources/W1siZiIsIjIwMTcvMTcvODQ2Z2Z2drZ2dxNF9UZXR0aW5nX3Byb3RvY29sXzE1MTEyMDE3LnBkZiJdXQ/Testing%20protocol%2015112017.pdf?sha=c8294a63c43d8ab3	
Date 2.2.2021	Signature 

7.3 How to Understand the Results

7.3.1 Acronyms Used in the Report

< Means less than

> Means bigger than

* Not a part of our accreditation

§ Deviation from method. Please see deviation section

a The method is not optimal for very volatile compounds. For these substances smaller results and a higher measurement uncertainty cannot be ruled out.

b The results have been corrected by the emission from untreated product specific substrate. Possible secondary emissions from the substrate cannot be excluded.

c Very polar organic compounds are not suitable for reliable quantification using Tenax TA adsorbent and HP-5 GC column. A high degree of uncertainty must be expected.

d The component may be overestimated due to exceeding the linear calibration range (contribution from the system) SER Specific Emission Rate.

7.3.2 Explanation of ID Category

Categories of Identity:

1: Identified by comparison with a mass spectrum obtained from library and supported by other information and quantified through specific calibration.

2: Identified by comparison with a mass spectrum obtained from library and supported by other information. Quantified as toluene equivalent.

3: Identified with a lower match by comparison with a mass spectrum obtained from a library. Quantified as toluene equivalent.

4: Not identified, quantified as toluene equivalent.

7.4 Description of VOC Emission Test

7.4.1 Test Chamber

The test chamber is made of stainless steel. A multi-step air clean-up is performed before loading the chamber, and a blank check of the empty chamber is performed. The chamber operation parameters are as described in the test method section. /1,2,3/

7.4.2 Expression of the Test Results

All test results are calculated as specific emission rate, and as extrapolated air concentration in the European Reference Room. /1,2/

7.4.3 Testing of VOC, SVOC and VVOC

The emissions of volatile organic compounds including volatile CMR substances (EU Class 1A and 1B, as per European law) are tested by drawing sample air from the test chamber outlet through Tenax TA tubes after the specified duration of storage in the ventilated test chamber. Analysis is performed by TD-GC/MS using HP-5 column (50 m, 0.2mm ID, 0.33µm film) /2,4/.

All CMR substances and single substances that are listed with a EU-LCI value in the latest publications /5/ (hereafter referred to as target compounds) are identified if present. All other appearing VOCs are identified as far as possible. Quantification of target compounds is done using the TIC signal and authentic response factors, or the relative response factors relative to toluene. For certain compound groups, which differ significantly in chemistry from toluene, quantification can be performed relative to a representative member of the group for more accurate and precise results. This can include quantification of for example glycols and acids. In addition to that, all results are also expressed in toluene equivalents. All non-target compounds, as well as all non-identified substances, are quantified in toluene equivalents.

The results of the individual substances (CMR substances not included) are calculated in three groups depending on their retention time when analyzing using a non-polar column (HP-5):

- Volatile Organic Compounds (VOC) are defined as: All substances eluting between and including acetic acid, 2,2,4-trimethyl-1,3-pentanediol-di-isobutyrate, n-hexane (n-C6) and n-hexadecane (n-C16).
- Semi-Volatile Organic Compounds (SVOC) are defined as: All substances eluting after n-hexadecane (n-C16) and before and including n-docosane (n-C22)
- Very Volatile Organic Compounds (VVOC) are defined as: All substances eluting before n-hexane (n-C6).

The results of the CMR substances are calculated in their own group.

Total Volatile Organic Compounds (TVOC) is calculated by summation of all individual VOCs between n-hexane and n-hexadecane with a concentration $\geq 5 \mu\text{g}/\text{m}^3$. Compounds regarded as VOC in line with the above definition but elute before n-C6 or after n-C16 on the HP-5 column are treated as VOC, and are thus added to the TVOC.

Total Semi-Volatile Organic Compounds (TSVOC) is calculated by the summation of all individual SVOCs expressed in toluene equivalents with a concentration $\geq 5 \mu\text{g}/\text{m}^3$, as defined in EN 16516. VOCs that are regarded as VOC in line with the above definition, but elute after n-C16 in this test, are not added to the TSVOC.

Total Very Volatile Organic Compounds (TVVOC) is calculated by the summation of all individual VVOCs with a concentration $\geq 5 \mu\text{g}/\text{m}^3$ and expressed in toluene equivalents. VOCs that are regarded as VOC in line with the above definition, but elute before n-C6 in this test, are not added to the TVVOC.

This test only covers substances which can be adsorbed on Tenax TA and can be thermally desorbed. If emissions of substances outside these specifications occur then these substances cannot be detected (or with limited reliability only).

7.4.4 Testing of Formaldehydes and Ammonia

Formaldehyde and ammonia are absorbed in dilute sulphuric acid. Formaldehyde is analysed spectrophotometrically with acetyl acetone method /6, 7/. Ammonia is analysed spectrophotometrically with ammonium cell test /8/.

7.4.5 Sensory Testing

An untrained panel of 15 members is performed the sensory evaluation of the product /1, 9/. The panellists evaluate the acceptability of the chamber air in scale clearly unacceptable ... fully acceptable (-1...+1).