

REPORT TRANSLATION KET2777A/99

EMISSION MEASUREMENTS



T050 (EN 45001)

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EMISSION MEASUREMENTS

Espoo 17.12.1999

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Object The emission measurements for the Finnish classification of finishing Materials.

The sample (Tuplex, sound resistant underlayment) was received at VTT Chemical Technology 12.11.1999. Emission measurements of volatile organic compounds (VOC), ammonia, and formaldehyde and sensory evaluation of the material were measured after four weeks¹ of production. During this time the sample was stored in a climate chamber under following conditions: Temperature $23 \pm 1^\circ\text{C}$, relative humidity $50 \pm 5\%$.

1) Sample age is calculated from the time point when the sample was unwrapped from the tight aluminium storage package at VTT. It does not refer to the manufacturing date of the material.

Chamber technique Emission measurements were performed according to the VTT Chemical Technology method description KET3300495 /1/ using 1,0 m³ stainless steel emission test chamber. Sensory evaluation was performed using 0,05 m³ glass or aluminium chamber (Climpaq) /2/.

The test conditions were:

	VOC, formaldehyde and ammonia	Sensory evaluation
Temperature	$23 \pm 1^\circ\text{C}$	$23 \pm 1^\circ\text{C}$
Relative humidity	$50 \pm 5\%$	$50 \pm 5\%$

Sampling and analysis methods

VOCs were adsorbed on Tenax TA. VOC samples were analysed with a gas chromatograph after thermal desorption /3/. The gas chromatograph is equipped with a flame ionisation detector (FID) and a mass selective detector (MSD). The detection limit of the measuring method is 1 µg/m³.

The total amount of VOCs (TVOC) was calculated from the total area of the FID-chromatogram between hexane and hexadecane using toluene response factor. Single VOCs were identified from the mass selective detector total ion chromatogram and quantified from the FID-chromatogram as toluene equivalents. Identifications are not confirmed with pure standards.

Formaldehyde was absorbed in deionized water and analysed with spectrometric acetylacetone-method /4/. The detection limit of the measuring method is 0,01 mg/m³.

Ammonia was absorbed in dilute sulphuric acid and analysed with ammonium specific electrode /5/. The detection limit of the measuring method is 0,005 mg/m³.

The sensory evaluation of the sample was performed according to the Finnish Building Research Institute method description /2/. Naive panel of five persons was used to evaluate the acceptability of the chamber air in scale not acceptable (-1...-0,1) - acceptable (+0,1...+1).

Results

Results are presented in Tables 1-2.

Table 1. Emission factors for formaldehyde, ammonia and TVOC and the average of the sensory evaluation. TVOC is given in toluene equivalents.

Product	µg/m ³ h			Sensory evaluation
	TVOC	NH ₃	Formaldehyde	
Tuplex	6	5	<5	+0,96

Table 2. TVOC concentration and the concentrations of the single identified compounds as toluene equivalents.

Compound	CAS	µg/m ³ h
Ethylbenzene	100-41-4	1
Styrene	100-42-5	4
TVOC		6
Identified		5
%		82%

Measurement uncertainty

TVOC/VOC emission factor	±20 %
Formaldehyde emission factor	±30 %
Ammonia emission factor	±25 %

References

1. VTT Chemical Technology method description KET3300495. Material emissions. Determination of volatile organic compounds (VOC) using chamber technique. The method is accredited.
2. Building Research Institute. Sensory evaluation of building materials. Material Classification Committee 10.9.1996. (*In Finnish*).
3. VTT Chemical Technology method description KET3300995. Analysing of volatile organic compounds (VOC) from Tenax TA using GC-FID/MSD-technique. (*In Finnish*).

4. prEN 717-1. Wood based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method. Brussels, 1996-04-06.
5. VTT Chemical Technology method description KET3300295. Determination of ammonium concentration in indoor air. The method is accredited

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Assignment Emission measurements for Classification of Finishing Materials

Specifications

Product	Sound resistant underlayment
Product name	Tuplex
Sample received at VTT	12.11.1999
Test period started	16.11.1999
Conditions during storage	Temperature 23±1 °C, rel. moisture 50±5 %
Emission measurements	13.12.1999 (chemical measurements) and 14.12.1999 (sensory evaluation)

Chamber technique

	Chamber	Ventilation	Temperature °C	Rel. moisture %	Test specimen area or loading
VOC, formaldehyde, ammonia	1 m ³	0,5 h ⁻¹	23±1	50±5	0,40 m ²
Sensory evaluation	Climpaq	0,93 l/s	23±1	50±5	0,53 m ²

Sampling and analysis methods

	Method	Adsorbent/ Absorbent	Volume [l]	Quantification/ Analysis method	Detection limit
VOC	KET3300495 KET3300995	Tenax TA 60/80 mesh	2,6-5,8	Quantification from FID-chromatogram as toluene equivalent	1 µg/m ³
Formaldehyde	prEN 717-1	deionised water	161	Spectrophotometric analysis with acetyl acetone method	0,01 mg/m ³
Ammonia	KET3300295	diluted sulphuric acid	555	Ion selective electrode	0,005 mg/m ³
Sensory evaluation	Untrained panel of five persons				

Results

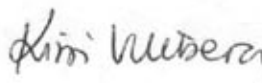
TVOC	mg/(m ² h) as toluene equivalent	0,006
Formaldehyde	mg/(m ² h)	<0,005
Ammonia	mg/(m ² h)	0,005
Carcinogens	mg/(m ² h)	<0,005
Sensory evaluation	Average of acceptability	+0,96

Uncertainty

Emission factor
 NH₃
 Formaldehyde

TVOC ± 20 %
 ± 25 %
 ± 30 %


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Appendix Chromatogram



File : M:\VUOSI99\VIKKO50\SQ131299\UPO27050.D
Operator :
Acquired : 14 Dec 1999 19:52 using AcqMethod VOC_DAY
Instrument : GC/MS Ins
Sample Name: Tuplex.13.12.99 A27050
Misc Info :
Vial Number: 5

