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Determination of the indoor- relevant time-value of floor lacquer Junckers GulvLak High Performance 2-komponent

Junckers A/S

696721-2D Report

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Wood Technology

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1. Summary

- Assignor:** F. Junckers Industrier
Værftsvej 4
4600 Køge
- Assignment:** Determination of the emission of volatile organic compounds expressed as the indoor-relevant time-value of lacquer for floors.
- Material:** Floor lacquer 2 component: GulvLak High Performance.
- Testing:** The emission testing was performed from 19.05.2016 to 16.06.2016.
- Methods:** ISO 16000-9: Indoor Air – Part 9: Determination of the emission of volatile organic compounds from building products and furnishing - Emission test chamber method.
Danish Society of Indoor Climate “Standard Test Method for Determination of the Indoor-Relevant Time-value by Chemical Analysis and Sensory Evaluation, 3rd ed. 2005.
Danish Indoor Climate Labelling “Testing and Labelling Criteria for Products for flooring installation Systems” 1st ed. 2011.06.11.
- Test result:** No carcinogenic compounds were found in the emissions.
- Based on chemical analyses the indoor-relevant time-value was measured to 3 days.
Regarding the sensory determination, the odour is perceived acceptable with weak odour intensity after 10 days.

The floor lacquer can thus be labelled with the indoor-relevant time-value:

10 days

Results of the testing and statement of the applied methods are stated on pages 3-7 and they only concern the tested specimens.

Extracts from the report may only be published if the laboratory has approved the extract.

Date/place: 15.07.2016, Danish Technological Institute, Wood Technology, Taastrup.



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Test responsible

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2. Assignor

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3. Assignment

Determination of the emission of volatile organic compounds expressed as the indoor climate relevant time-value for floor lacquer. The determination is carried out by chemical and sensory (odour) analysis.

4. Test material

The test material was sampled by the assignor, and received at the Danish Technological Institute on 11.05.2016.



Product: Junckers GulvLak High Performance 2-komponent vandbaseret & hærder

Production code: 00.83300316, 89190216

The lacquer was prepared before application by mixing the 2 components were mixed according to suppliers instruction.

Test specimens were prepared by application of one layer of lacquer by roll on glass plates according to the recommended loading of 11 L/m² (1.06 g/mL) and after drying overnight subsequently placed in the test chamber.

5. Test method

Danish Society of Indoor Climate: „Standard Test Method for Determination of the Indoor-Relevant Time-Value by Chemical Analysis and Sensory Evaluation, 3rd ed. 2005“ and Danish Indoor Climate Labelling “Testing and Labelling Criteria for Products for flooring installation Systems” 1st ed. 2011.06.11 and ISO 16000-9: Indoor Air – Part 9: Determination of

the emission of volatile organic compounds from building products and furnishing - Emission test chamber method“.

6. Chemical analysis

6.1 Measurement programme

According to the Standard test method the emission were analysed for carcinogenic compounds (IARC, group 1), aldehydes and other volatile organic compounds (VOC's).

6.2 Climate chamber conditions

Climate chamber:	113 l polished stainless steel
Temperature	23°C ± 1 °C
Relative humidity	50 ± 5% RH
Air change	0.5 ± 0.05 h ⁻¹
Air velocity	0.1 – 0.3 m/s
Material load	1 m ² /m ³

Test specimen (30 x 38 cm) in chamber:



6.3 Quantitative analysis

Air samples were taken from the climate chamber after 3, 10 and 28 days.

Collection medium for aldehydes: DNPH-tube (C₁₈ coated with 2,4-dinitrophenylhydrazine)

Collection medium for Volatile Organic Compounds (VOC's): Tenax TA®

Aldehydes were after elution with acetonitrile analysed by HPLC (liquid chromatography) with UV detection according to ISO 16000-3. Indoor Air – Part 3: Determination of formaldehyde and other carbonyl compounds – Active sampling method. Limit of quantification was 1 µg/m³ (formaldehyde, acetaldehyde, 2-propenal, propanal, butanal).

VOC's were analysed by GC-MS according to ISO 16000-6. Indoor Air – Part 6: Determination of volatile organic compounds in indoor air and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS/FID. Quantification was done in concentrations above 1 µg/m³ using pure reference compounds.

Samples were taken from the empty chamber prior to testing. Blind tubes were likewise analysed in connection with the chemical analyses.

7. Sensory determination

For the sensory determination test specimens were prepared according to section 4 with a total surface area of 2.6 m² by application of lacquer on both sides of glass plates 38 cm x 60 cm.

The sensory determination was carried out after 10 days' conditioning of the test specimens in the Climpaq.

An untrained panel of min. 20 persons has evaluated the intensity and the acceptability of the air (Appendix 1).

Sensory analysis:

Climate chamber:	Climpaq, 200 l glass chamber
Temperature	23°C ± 2°C
Relative humidity	50 ± 5% RH
Air change	0.9 l/s
Air velocity	0.1 – 0.2 m/s
Panel load	2.6 m ² , corresponding to floor loading in a standard room.

8. Results

The result of the chemical analyses appears from Table 1.

The measured climate chamber concentrations (area specific emission rate - SER) were converted into concentration in a standard room by a conversion factor of 0.8 based on the following calculations.

The area specific air flow rate (q) is dependent on the loading factor of the material surface in the test chamber and the air change rate, and is universal for conversion of measured concentrations into standard room concentrations

$$q = \frac{\text{Air exchange rate}}{\text{Material load}}$$

The material load of floor in the standard room is 1.25 m²/m³.

Hence, the conversion factor can be deduced:

$$\text{Conversion factor (Model room)} = \frac{q(\text{Chamber})}{q(\text{Model room})} = \frac{1 \text{ m}^3/\text{m}^2\text{h}}{1.25 \text{ m}^3/\text{m}^2\text{h}} = 0.8$$

$$\text{Concentration standard room} = 0.8 \times \text{Measured concentration}$$

**Table 1. Emissions from product: Junckers GulvLak High Performance 2-komponent
Material load floor 7 m² in a standard room 17.4 m³ with an air change of 0.5 h⁻¹**

CAS-no.	Substance	Measured µg/m ² h 3 days	Conc. µg/m ³ 3 days	Measured µg/m ² h 10 days	Conc. µg/m ³ 10 days	Measured µg/m ² h 28 days	Conc. µg/m ³ 28 days
000050-00-0	Formaldehyde (VVOC)	1.7	1.4	1.1	0.9	1.5	1.2
000067-64-1	Acetone (VVOC)	4	3	3	2	4	3
000064-19-7	Acetic acid	10	8	15	12	8	6
000108-88-3	Toluene	1	1	-	-	-	-
000541-05-9	Hexamethylcyclotrisiloxane	2	2	1	1	-	-
000111-76-2	Butylglycol	2	2	-	-	4	3
034590-94-8	DPGMME mixed isomers	5	4	-	-	-	-
000124-13-0	Octanal	1	1	-	-	-	-
111109-77-4	DPGDME (mixture of isomers)	18	14	3	2	-	-
	Glycoleether (Toluene)	18	14	-	-	-	-
	Glycoleether? (Toluene)	5	4	3	2	-	-
000124-19-6	n-Nonanal	4	3	2	2	2	2
002682-20-4	2-Methyl-4-isothiazolin-3-one	6	5	-	-	-	-
000112-34-5	Butyldiglycol	1467	1174	244	195	19	8
000112-31-2	n-Decanal	3	2	2	2	-	-
000124-17-4	Butyldiglycol acetate	4	3	-	-	1	1
000128-37-0	2,6-Di-tert-butyl-4-methylphenol (BHT)	4	3	1	1	-	-
	Carboxylic acid ester (Methyl dodecanoate)(SVOC)	17	14	15	12	10	8
	Sum other siloxanes:	6	5	-	-	-	-
	Sum unidentified compounds:	11	9	-	-	-	-

The fragments/substances shown in subscript were used for the quantification

VVOC: Very volatile organic compound

SVOC: Semivolatile organic compound

- : not detected (< 1 µg/m³ measured concentration)

No carcinogenic compounds were found according to (IARC, WHO): Overall Evaluations of Carcinogenicity to Humans, Group 1. (Formaldehyde is excepted from this recommendation by the Danish Indoor Climate Labelling).

The indoor climate relevant time-value is determined as the time until the emission of the decisive single compound calculated to concentration in a standard room is below half of the threshold value for irritation.

From the result table from the chemical analyses it appears that the emission of all chemical compounds is below half of the threshold value for irritation after 10 days.

The time value for the chemical determination is thus measured to 10 days.

The time value for the sensory evaluation is determined to 10 days, where the odour expression is acceptable (+0.6) and the odour intensity is 0.9 corresponding to a weak odour.

The requirements according to the Danish Society of Indoor Climate are acceptability higher than 0 and an intensity of max. 2.

The indoor-relevant time value is thus determined by the combined sensory and chemical determinations to be 10 days.

Appendix 1 Sensory Determination – Results

Sample no.: 696721-2 **Received:** 17-05-2016 **Test date:** 27-05-2016
Description: Junckers GulvLak High Performance 2- **Order no.:** 696721-2
komponent
Comments: 2.6 m² lacquer on glass (17/18-05-2016) in climpaq 3 on 19-05-2016.

	Reference Acceptability	Reference Intensity	Sample Acceptability	Sample Intensity
1	0,45	1,6	0,35	1,5
2	-0,20	2,0	0,30	1,5
3	0,70	0,8	0,70	0,6
4	0,65	1,9	0,70	1,0
5	1,00	0,6	1,00	0,0
6	0,30	3,0	0,30	2,0
7	0,25	1,0	0,30	2,0
8	0,75	0,5	0,75	0,6
9	0,70	1,5	0,75	0,8
10	1,00	0,0	0,80	0,8
11	0,55	1,0	-0,10	2,7
12	0,70	1,1	-0,15	2,2
13	0,90	0,1	0,90	0,2
14	1,00	0,0	0,90	0,3
15	0,95	0,6	0,60	1,5
16	0,35	1,0	0,60	0,2
17	0,30	1,4	0,25	0,7
18	0,70	1,0	0,45	1,8
19	0,95	0,1	0,95	0,1
20	0,70	0,9	0,60	1,0
Median	0,70	1,0	0,60	0,9

