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Date
27 April 2015

M1 Test Report

1 Sample Information

Sample identification	Protecta FR ASF
Batch no.	50047454*
Production date	14/01/2015*
Product type	Sealant

2 Evaluation of the Results

The tested product complies with the requirements of the M1 Protocol for Chemical and Sensory Testing of Building Materials as published by Rakennustietosäätiö RTS. (version 22.1.2015).

Parameter	**Concentration** mg/m^3	**M1** mg/m^3
TVOC	< 0.005	≤ 0.02
Formaldehyde	< 0.003	≤ 0.01
Ammonia	< 0.01	≤ 0.01
Carcinogenic compounds	< 0.001	≤ 0.001
Odour (dimensionless)	0.5	≥ +0.0

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3 Test Method

Product	
Product name	Protecta FR ASF
Production date (by the manufacturer)	14/01/2015
Sending date (by the manufacturer)	-
Description of packaging and transport	Properly packaged and not damaged.
Product received at the testing laboratory, date	06.02.2015
Thickness of the sample	3 mm
Test period started, date	19.02.2015
Conditions during ageing (C°,RH%)	23 °C, 50 % RH in test chamber
Emission sampling, date	19.03.2015

Sample preparation

The sample was applied onto a glass plate and drawn off over a model giving a 3 mm thick and uniform layer with a broadness of 10 mm.

Chamber techniques

Parameter	Chamber volume and type	Air change rate (h^{-1})	Temperature (°C ± °C)	Relative humidity (%)	Test specimen loading factor (m^2m^{-3})
Chemical and sensory testing	Stainless steel 119 l	0.5	23 ± 1	50	0.007

Emission sampling and analytical methods

Parameter	Method, Standard or own validated method	Adsorbent / Absorbent	Sampling volume (l)	Quantification / Analysis method	Detection limit of the method used
VOC, TVOC	2808	Tenax	Ca 9.6	GC/MS	5 µg/m^3
Formaldehyde	8400	DNPH-coated silicagel	Ca 44	HPLC/UV	3 µg/m^3
Ammonia	4430	Sulphuric acid coated silicagel	Ca 100	Spectrofotometry	10 µg/m^3
Sensory evaluation	9800 mod.	-	-	Human nose	-

4 Test results

4.1 Summary of Results

Results – Chemical and sensory testing		
TVOC	µg/m^3 as toluene equivalent between C_6 to C_{16}	< 5
Single VOCs C_6 to C_{16}	See separate table in section 4.2	
Single VOCs outside the frame C_6 to C_{16}	See separate table in section 4.2	
Formaldehyde	µg/m^3	< 3
Ammonia	µg/m^3	< 10
Carcinogens, SER > 1 µg/m^3	µg/m^3 (toluene equivalents)	< 1
The chromatogram with identified main components	See section 5.1	

4.2 Chemical testing

Single VOCs C6-C16			
Retention time	**Name**	**CAS Number**	**µg/m^3**
	TVOC		< 5
	Identified		-
	Identification %		-

Single VOCs outside the frame C6-C16			
Retention time	**Name**	**CAS Number**	**µg/m^3**
	TVVOC+TSVOC		< 5
	Identified		-
	Identification %		-

Measurement uncertainty	The uncertainty of the testing procedure including all steps from material or product sampling to final results.	
SER_{TVOC} ± 22 % RSD	SER_{NH3} ± 22 % RSD	$SER_{Formaldehyde}$ ± 22 % RSD

* Not a part of our accreditation. See 5.3.9 AccreditationFor detailed method description see page 7: 5.3 Description of the applied test method

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

4.3 Sensory testing

Results of sensory testing		
	Average of assessments	Standard deviation:
Total	**0.5**	**0.4**
1st Assessment	0.5	0.4
2nd Assessment	0.5	0.4

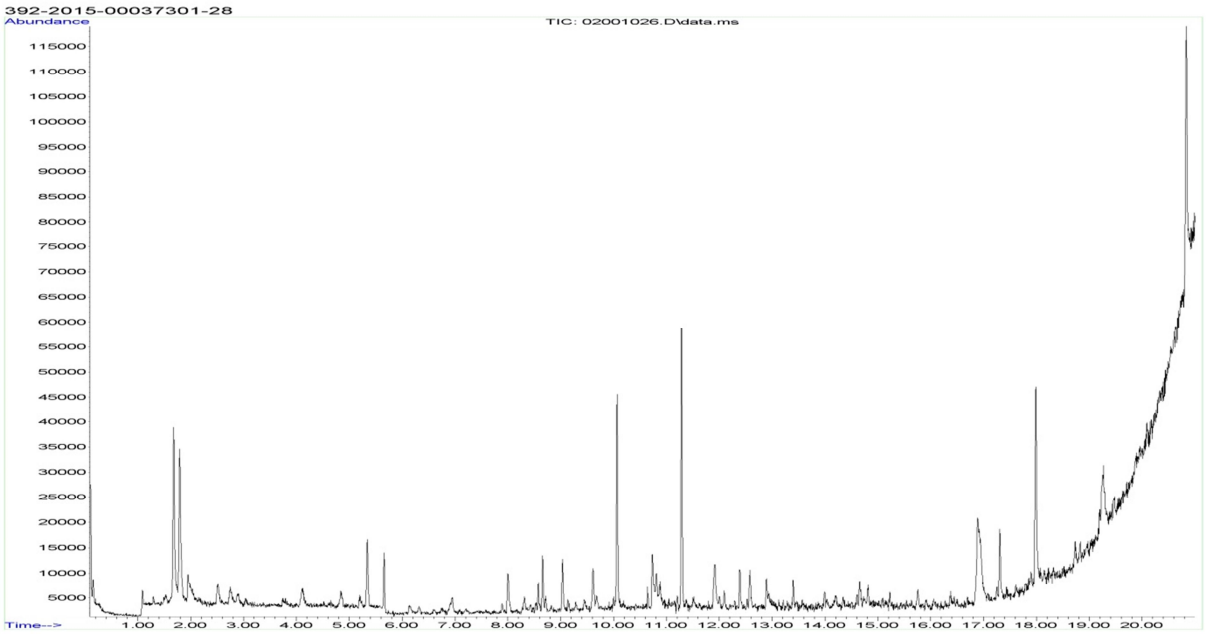
Individual assessments by the sensory panel:					
	1st assessment	2nd assessment		1st assessment	2nd assessment
Person 1	0.4	0.4	Person 13	0.6	0.6
Person 2	1.0	1.0	Person 14	0.8	0.8
Person 3	0.8	0.8	Person 15	-0.4	-0.3
Person 4	1.0	1.0	Person 16	0.4	0.6
Person 5	0.6	0.6	Person 17	0.8	0.9
Person 6	-0.2	-0.2	Person 18		
Person 7	0.3	0.2	Person 19		
Person 8	0.0	0.0	Person 20		
Person 9	0.5	0.4	Person 21		
Person 10	0.8	0.8	Person 22		
Person 11	0.2	0.2	Person 23		
Person 12	0.9	0.9	Person 24		

Maria Pelle
Chemist

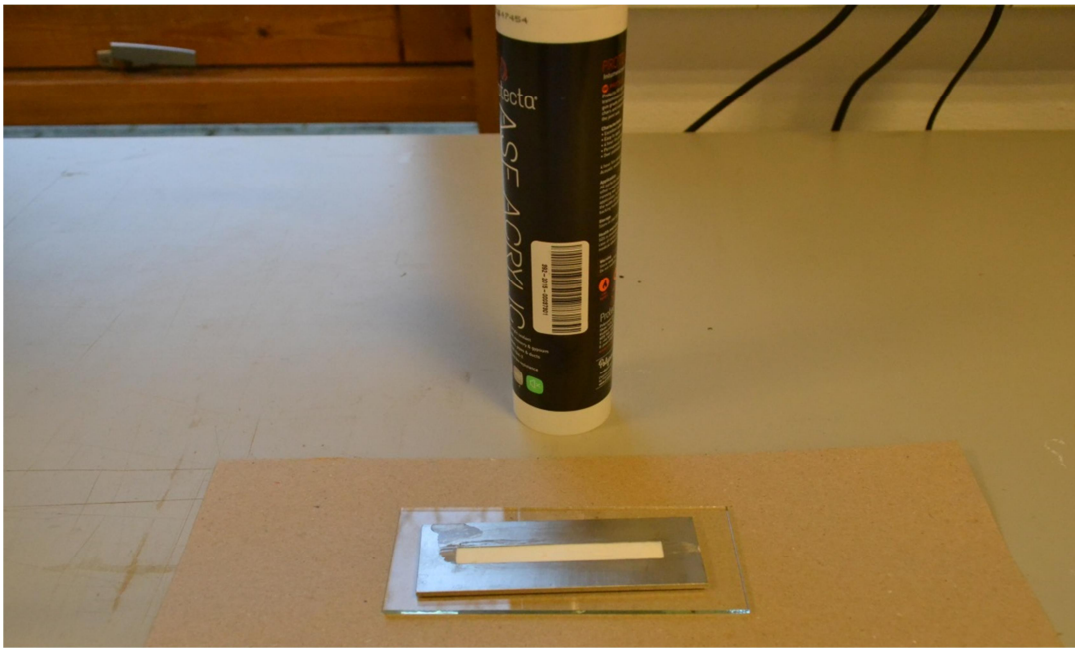
Janne R. Norup
Chemist

5 Appendix

5.1 Chromatogram after 28 days



5.2 Image of the sample



5.3 Description of the applied test method

The applied method complies with the Protocol for Chemical and Sensory Testing of Building Materials as defined by the Finnish Emission Classification of Building Materials (version of 2004). The test method is based on the published methods: ISO 16000-3, ISO 16000-6, 16000-9, 16000-11. The internal method numbers are: 9810, 9811, 9812, 2808, 4430 and 8400.

5.3.1 Test Chamber

The test chamber was consisting of stainless steel. The air clean-up was realized in multiple steps. Before loading the chamber a blank check of the empty chamber was performed. The operation parameters were 23 °C, 50 % relative air humidity (in the supply air) with an air exchange rate of ½ per hour. .

5.3.2 Sampling, Desorption, Analyses

All emissions were calculated as area specific emission rate SER with the following formula:

SER = C x n / L

With:
C Concentration in test chamber, µg/m³
n Air exchange rate, 1/h
L Loading factor, m²/m³

5.3.3 Testing of Carcinogens after 28 Days

The presence of volatile organic carcinogens (IARC 1987 listing, category C1, 1 µg/m²xh and above), which means benzene and vinyl acetate, was tested.

The test was done by drawing air samples from the chamber outlet through Tenax TA tubes (main tube and backup tube) after 28 days. Analyses were done by thermal desorption and gas chromatography / mass spectroscopy (internal methods: 9812 / 2808).

The absence of a listed carcinogen was stated if the specific combination of fragment ions was lacking at the specific retention time in the chromatogram. Otherwise it was checked whether the required detection limit (1 µg/m²xh) was exceeded. In this case the identity was finally checked by comparing full scan sample mass spectra with full scan standard mass spectra.

5.3.4 Testing of VOC, SVOC, VVOC after 28 Days

The emissions of organic compounds after 28 days were tested by drawing air samples from the chamber outlet through Tenax TA tubes (main tube and backup tube). Analyses were done by thermal desorption and gas chromatography / mass spectroscopy (internal methods: 9812 / 2808).

Quantification was done with the Total Ion Chromatogram (TIC) signal, or in case of overlapping peaks by calculating with fragment ions. All identified and non-identified substances were quantified as toluene equivalent.

The results of the individual substances were calculated in three groups depending on their appearance in a gas chromatogram when analysing with a non-polar column (HP-5):

- Volatile organic compounds VOC: All substances appearing between these limits.
- Very volatile organic compounds VVOC: All substances appearing before n-hexane (n-C_6).
- Semi-volatile organic compounds SVOC: All substances appearing after n-hexadecane (n-C_{16}).

Calculation of the TVOC (Total Volatile Organic Compounds) was done by addition of the results of all substances between C_6 and C_{16} as toluene equivalent, as defined in ISO 16000-6.

Calculation of the TSVOC (Total Semi-Volatile Organic Compounds) was done by addition of the results of all substances between C_{16} and C_{22} as toluene equivalent, as defined in ISO 16000-6.

Calculation of the TVVOC (Total Very Volatile Organic Compounds) was done by addition of the results of all substances appearing before C_6 as toluene equivalent, as defined in ISO 16000-6.

This test covered only substances that can be adsorbed on Tenax TA and that can be thermally desorbed. If other emissions occurred then these could not be monitored (or with limited reliability only).

5.3.5 Testing of Formaldehyde after 28 Days

The presence of formaldehyde was tested by drawing air samples from the chamber outlet through DNPH-coated silicagel tubes after 28 days. Analysis was done by solvent desorption, HPLC and UV-/diode array detection (ISO 16000-3, internal methods: 9812 / 8400).

The absence of formaldehyde was stated if the specific wavelength UV detector response was lacking at the specific retention time in the chromatogram. Otherwise it was checked whether the detection limit was exceeded. In this case the identity was finally checked by comparing full scan sample UV spectra with full scan standard UV spectra.

5.3.6 Testing of Ammonia after 28 days

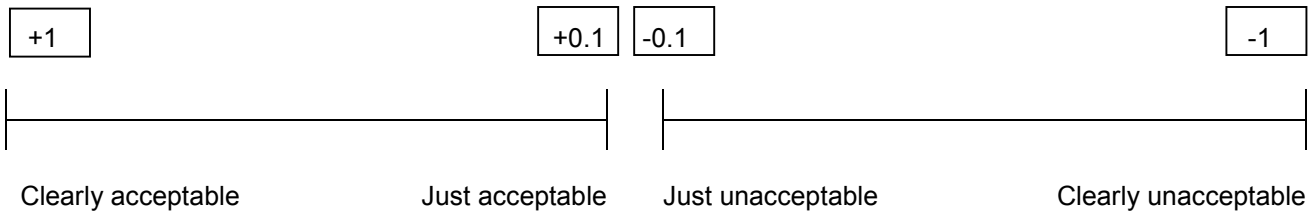
The presence of ammonia was tested by drawing air samples from the chamber outlet through silicagel tubes coated with sulphuric acid after 28 days. Analysis was done by solvent desorption and UV/VIS spectroscopy (internal methods: 9812 / 4430).

The absence of ammonia was stated if the signal was lacking at the specific wavelength. Otherwise it was checked whether the detection limit was exceeded.

5.3.7 Sensory Testing after 28 Days

The sensory testing was done after 28 days storage under controlled conditions in the testing chamber. The test panel assessed the odour first of the room air and then give the odour rating twice for each chamber. Between two assessments there was a minimum break of 2 minutes. Each single judgement was based on the odour impression after 2-3 inhalations. The odour was rated immediately after each assessment on a continuous scale with values between +1 (clearly acceptable) and -1 (clearly unacceptable), with just acceptable = +0.1 and just unacceptable = -0.1. The scale was read with an accuracy of ± 0.1. The result was calculated as the average of the assessments from the odour rating of the panel, and only results with a note > 0.1 are accepted. Only panel members rating clean moistened air as acceptable (> 0.8) were considered in the calculation.

Sensory acceptance:



5.3.8 Deviations from the M1 Test Method

No deviations.

5.3.9 Accreditation

The sensory testing method is not yet covered by the accreditation (EN ISO/IEC 17025:2005) by DANAK (no. 522). Anyway, Eurofins is accepted by RTS, Finland, for M1 testing - including sensory testing.

The testing methods described above have been accredited (ISO 17025-1) by DANAK (no. 522). But some parameters are not yet covered by that accreditation. At present the accreditation does not cover the parameters marked with a note *. But the analysis was done for these parameters at the same level of quality as for the accredited parameters.

5.3.10 Uncertainty of the test method

The relative standard deviation of the test method is amounted to 22% (RSD). The expanded uncertainty U_m is 45% and equals 2 x RSD%, see also www.eurofins.dk/uncertainty. This uncertainty does not include sensory testing.