

Sika Oesterreich GmbH
 Bingser Dorfstraße 23
 6700 BLUDENZ
 AUSTRIA

Eurofins Product Testing A/S
 Smedeskovvej 38
 8464 Galten
 Denmark

CustomerSupport@eurofins.com
 www.eurofins.com

VOC EMISSION TEST REPORT


French VOC Regulation

25 August 2023

1 Sample Information

| | |
|------------------------|-------------------|
| Sample name | SikaMonoTop®-4052 |
| Batch no. | 3006734374 |
| Stated production date | 14/11/2022 |
| Product type | Screed |
| Sample reception | 15/12/2022 |

2 Brief Evaluation of the Results

| Regulation or protocol | Conclusion | Version of regulation or protocol |
|------------------------|---|--|
| French VOC Regulation |  | Decree of March 2011 (DEVL1101903D) and Arrêté of April 2011 (DEVL1104875A) modified in February 2012 (DEVL1133129A) |

Full details based on the testing and direct comparison with limit values are available in the following pages
 Regarding pass/fail decision rule please see appendix


 Laura Hartung Sørensen
 Analytical Service Manager

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3 Applied Test Methods

3.1 General Test References

| Regulation, protocol or standard | Version | Reporting limit VOC [$\mu\text{g}/\text{m}^3$] | Calculation of TVOC | Combined uncertainty ^a [RSD(%)] |
|----------------------------------|---|--|---------------------|--|
| EN 16516 | 2017 + A1:2020 | 5 | Toluene equivalents | 22% |
| ISO 16000 -3 -6 -9 -11 | 2006-2022 depending on part | 2 | Toluene equivalents | 22% |
| ASTM D5116-10 | 2010 | - | - | - |
| French VOC Classes | Decree of 03/2011 (DEVL1101903D) and arrêté of 02/2012 (DEVL1133129A) | 2 | Toluene equivalents | 22% |

3.2 Specific Laboratory Sampling and Analyses

| Procedure | External Method | Internal SOP | Quantification limit / sampling volume | Analytical principle | Uncertainty ^a [RSD(%)] |
|--------------------------|---|--------------|--|-------------------------|-----------------------------------|
| Sample preparation | ISO 16000-11:2006, EN 16516:2017+A1:2020, AgBB:2021, EMICODE:2022 | 71M549810 | - | - | - |
| Emission chamber testing | ISO 16000-9:2006, EN 16516:2017+A1:2020 | 71M549811 | - | Chamber and air control | - |
| Sampling of VOC | ISO 16000-6:2021, EN 16516:2017+A1:2020 | 71M549812 | 5 L | Tenax TA | - |
| Analysis of VOC | ISO 16000-6:2021, EN 16516:2017+A1:2020 | 71M542808B | 1 $\mu\text{g}/\text{m}^3$ | ATD-GC/MS | 10% |
| Sampling of aldehydes | ISO 16000-3:2022, EN 16516:2017+A1:2020 | 71M549812 | 35 L | DNPH | - |
| Analysis of aldehydes | ISO 16000-3:2022, EN 16516:2017+A1:2020 | 71M548400 | 3-6 $\mu\text{g}/\text{m}^3$ | HPLC-UV | 10% |

The results are only valid for the tested sample(s).

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4 Test Parameters, Sample Preparation and Deviations

4.1 VOC Emission Chamber Test Parameters

| Parameters | Value | Sample Conditions | Value |
|--|--------|--|-------------------------|
| Chamber volume, V[L] | 119 | Date and time of unpacking | |
| Air change rate, n[h ⁻¹] | 0.5 | Preconditioning period | - |
| Air Velocity [m/s] | 0.1 | Chamber test period | 03/01/2023 - 31/01/2023 |
| Area specific ventilation rate, q [m/h or m ³ /m ² /h] | 1.25 | Analytical test period | 03/01/2023 - 03/02/2023 |
| Relative humidity of supply air, RH [%] | 50 ± 3 | Exposed sample area [m ²] | |
| Temperature of supply air, T [°C] | 23 ± 1 | Loading factor [m ² /m ³] | 0.4 |
| Background concentration of individual VOC's [µg/m ³] | < 2 | Test scenario | Flooring or ceiling |
| Background concentration of TVOC [µg/m ³] | < 20 | | |

4.2 Preparation of the Test Specimen

The sample was mixed homogeneously, 1500 g powder in 195 g water. A part of the mixture was poured into two petri discs giving a 12 +/- 1 mm thick and uniform layer.

4.3 Picture of Sample



4.4 Deviations from Referenced Protocols and Regulations





No deviations from the referenced test methods were observed.

4.5 Air Samplings from the Test Chamber

| Sampling media | Day (yyyy-mm-dd) | Time (hh:mm) | Volume [L] |
|----------------------------|------------------|---------------|------------|
| 28 Day, Tenax TA | 2023-01-31 | 07:53 - 08:53 | 5.2 |
| 28 Day-Res, Tenax TA | 2023-01-31 | 08:53 - 09:43 | 2.2 |
| 28 Day, DNPH silicagel | 2023-01-31 | 07:52 - 09:42 | 36 |
| 28 Day-Res, DNPH silicagel | 2023-01-31 | 07:52 - 09:42 | 36 |

5 Summary and Evaluation of the Results

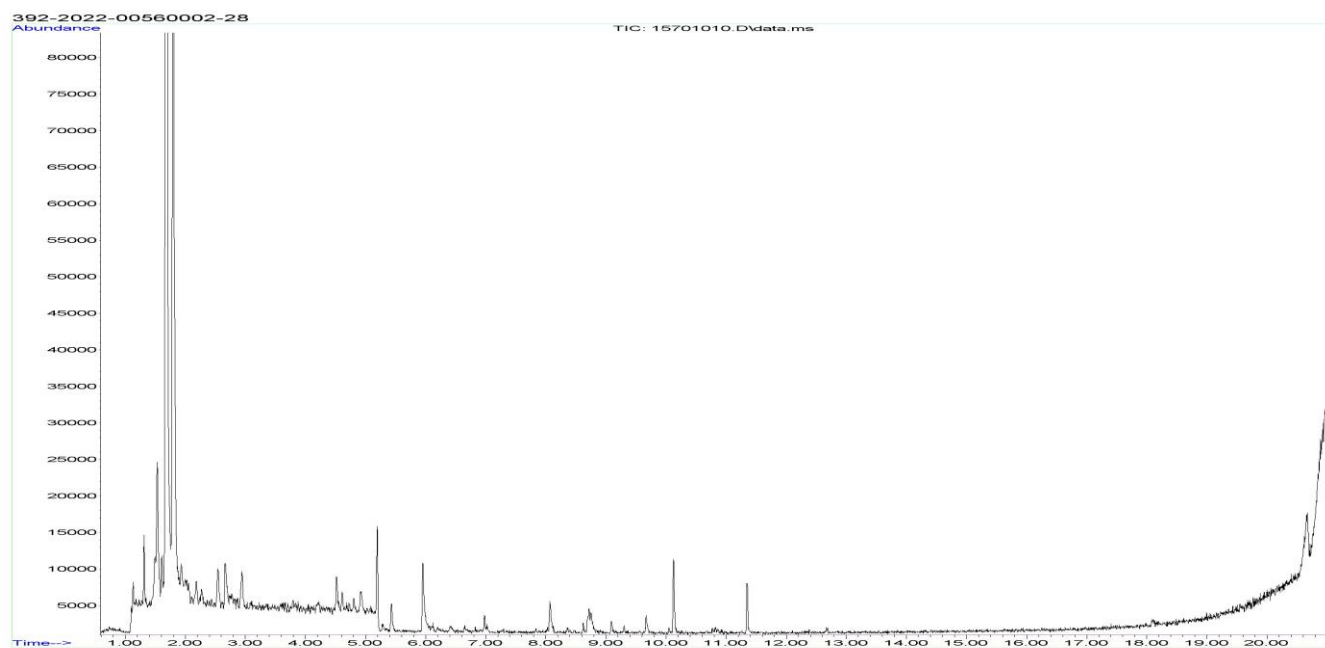
5.1 Comparison with Limit Values of the French VOC Regulation

| | CAS No. | Conc. 28 days $\mu\text{g}/\text{m}^3$ |  $\mu\text{g}/\text{m}^3$ |  $\mu\text{g}/\text{m}^3$ |  $\mu\text{g}/\text{m}^3$ |  $\mu\text{g}/\text{m}^3$ |
|------------------------|-----------|--|--|---|---|---|
| TVOC | - | < 2 | > 2000 | < 2000 | < 1500 | < 1000 |
| Formaldehyde | 50-00-0 | < 3 | > 120 | < 120 | < 60 | < 10 |
| Acetaldehyde | 75-07-0 | 5.5 | > 400 | < 400 | < 300 | < 200 |
| Toluene | 108-88-3 | < 2 | > 600 | < 600 | < 450 | < 300 |
| Tetrachloroethylene | 127-18-4 | < 2 | > 500 | < 500 | < 350 | < 250 |
| Ethylbenzene | 100-41-4 | < 2 | > 1500 | < 1500 | < 1000 | < 750 |
| Xylene | 1330-20-7 | < 2 | > 400 | < 400 | < 300 | < 200 |
| Styrene | 100-42-5 | < 2 | > 500 | < 500 | < 350 | < 250 |
| 2-Butoxyethanol | 111-76-2 | < 2 | > 2000 | < 2000 | < 1500 | < 1000 |
| 1,2,4-Trimethylbenzene | 95-63-6 | < 2 | > 2000 | < 2000 | < 1500 | < 1000 |
| 1,4-Dichlorobenzene | 106-46-7 | < 2 | > 120 | < 120 | < 90 | < 60 |

The product was assigned a VOC emission class without taking into account the measurement uncertainty associated with the result. As specified in French Decree no. 2011-321 of March 23 2011, correct assignment of the VOC emission class is the sole responsibility of the party responsible for distribution of the product in the French market.

6 Appendices

6.1 Chromatogram of VOC Emissions after 28 Days



6.2 How to Understand the Results

6.2.1 Acronyms Used in the Report

| | |
|-----|--|
| < | Means less than |
| > | Means bigger than |
| * | Not a part of our accreditation |
| ± | Please see section regarding uncertainty in the Appendices |
| § | 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 component originates from the substrate and is thus removed |
| c | The results have been corrected by the emission from the substrate |
| d | Very polar organic compounds are not suitable for reliable quantification using Tenax TA adsorbent and HP-5ms GC column. A high degree of uncertainty must be expected |
| e | The component may be overestimated due to contribution from the system |
| SER | Specific Emission Rate |

6.3 Description of VOC Emission Test

6.3.1 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. (EN 16516, ISO 16000-9, internal method no.: 71M549811).

The recovery rates in the climate test chamber have been investigated using toluene and n-dodecane. The mean recovery rates of toluene and n-dodecane were concluded to be between 95 % and 100 % depending on the chamber size. These values comply with the criteria of a minimum mean recovery rate of 80 % stated in the 16000-9 test method.

Air sampling from the test chamber is carried out in a clean test chamber room at ambient air pressure and 23 ± 1 °C.

6.3.2 Expression of the Test Results

All test results are calculated as specific emission rate, and as extrapolated air concentration in the European Reference Room (EN 16516, AgBB, EMICODE, M1 and Indoor Air Comfort).

6.3.3 Testing of VOC

The emissions of volatile organic compounds 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 ATD-GC/MS using HP-5 column (30 m, 0.25mm ID, 0.25µm film).

All eight substances are identified if present. Quantification above $2 \mu\text{g}/\text{m}^3$ is done using the TIC signal and authentic response factors.

Total Volatile Organic Compounds (TVOC) is calculated by summation of all individual VOCs with a concentration $\geq 2 \mu\text{g}/\text{m}^3$. The TVOC is expressed in toluene equivalents as defined in EN 16516 and similar to ISO 16000-6.

6.3.4 Testing of Aldehydes

The presence of aldehydes is tested by drawing air samples from the test chamber outlet through DNPH-coated silicagel tubes after the specified duration of storage in the ventilated test chamber. Analysis is performed by solvent desorption and subsequently by HPLC and UV-/diode array detection.

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

Conversions of specific aldehydes from $\mu\text{g}/\text{m}^3$ to ppm are done by the ideal gas law using a temperature of 23 degree Celsius and standard atmospheric pressure.

6.4 Quality Assurance

Before loading the test chamber, a blank check of the empty chamber is performed and compliance with background concentrations in accordance with EN 16516 / ISO 16000-9 is determined.

Air sampling at the chamber outlet and subsequent analysis is performed in duplicate. Relative humidity, temperature and air change rate in the chambers is logged every 5 minutes and checked daily. A double determination is performed on random samples at a regular interval and results are registered in a control chart to ensure the uncertainty and reproducibility of the method.

The results are only valid for the tested sample(s).

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The stability of the analytical system is checked by a general function test of device and column, and by use of control charts for monitoring the response of individual substances prior to each analytical sequence.

6.5 Accreditation

The testing methods described above are accredited on line with EN ISO/IEC 17025 by DANAK (no. 522). This accreditation is valid worldwide due to mutual approvals of the national accreditation bodies (ILAC/IAF, see also www.eurofins.com/galten.aspx#accreditation).

Not all parameters are covered by this accreditation. The accreditation does not cover parameters marked with an asterisk (*), however analysis of these parameters is conducted at the same level of quality as for the accredited parameters.

6.6 Uncertainty of the Test Method

The relative standard deviation of the overall analysis is 22%. The expanded uncertainty U_m equals $2 \times$ RSD. For further information please visit www.eurofins.dk/product-testing/uncertainty/.

6.7 Decision Rules

Eurofins Product Testing A/S, declare statement of conformity based on the “Binary Statement for Simple Acceptance Rule” described in ILAC’s “Guidelines on decision Rules and Statements of Conformity” ILAC-G8:09/2019.

This means that results above the detection limit are always reported with two significant digits. Results are evaluated with the same number of significant digits as the corresponding limit values, and conformity is based on results being less than or equal to limit values.

For limit values with more than two significant digits, the third digit will be used to confirm whether a result is below or equal to the limit value. It will always be indicated in the evaluation table if this expanded evaluation is performed.

For further information, please visit www.eurofins.dk/product-testing/om-os/beslutningsregler/

6.8 Version History

| Report date | Report number | Modification |
|-------------|------------------------|-----------------|
| 25/08/2023 | 392-2022-00560002_E_EN | Current version |