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VOC TEST REPORT
ANSI/BIFMA

9 October 2025

1 Sample Information

Sample name	List of fabrics for BIFMA
Batch no.	See section 4.2 of report
Stated production date	08/09/2025
Product type	Wall covering (textile and wall paper)
Sample reception	12/09/2025

2 Brief Evaluation of the Results

Regulation or protocol	Conclusion	Version of regulation or protocol
ANSI/BIFMA, section 7.6.1	Pass	ANSI/BIFMA e3-2014e "Furniture Sustainability Standard"
ANSI/BIFMA, section 7.6.2	Pass	ANSI/BIFMA e3-2014e "Furniture Sustainability Standard"
ANSI/BIFMA, section 7.6.3	Pass	ANSI/BIFMA e3-2014e "Furniture Sustainability Standard"

Full details based on the testing and direct comparison with limit values is available in the following pages
Due to the registered deviations, please refer to section 4.4

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3 Applied Test Methods

3.1 General Test References

Regulation, protocol or standard	Version	Reporting limit VOC [µg/m³]	Calculation of TVOC	Combined uncertainty[a] [RSD(%)]
EN 16516	2017 + A1:2020	5	Toluene equivalents	22%
ISO 16000 -3 -6 -9 -11	2021-2024 depending on part	2	Toluene equivalents	22%
ASTM D5116-10	2010	-	-	-
ANSI/BIFMA	ANSI/BIFMA M7.1-2011 (R2016)	2	Toluene equivalents	22%
ANSI/BIFMA	e3-2014e	-	-	-
CDPH	CDPH/EHLB/Standard Method V1.2. (January 2017)	2	Toluene equivalents	22%

3.2 Specific Laboratory Sampling and Analyses

Procedure	External Method	Internal S.O.P.	Quantification limit	Analytical principle	Uncertainty[a] [RSD(%)]
Sample preparation	ISO 16000-11:2024, EN 16516:2017+A1:2020, AgBB:2024, EMICODE:2020	71M549810	-	-	-
Emission chamber testing	ISO 16000-9:2024, 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 µg/m³	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 µg/m³	HPLC-UV	10%

4 Test Parameters, Sample Preparation and Deviations

4.1 VOC Emission Chamber Test Parameters

Parameters	Value	Sample Conditions	Value
Chamber volume, V[L]	1000	Date and time of unpacking and start of sample preparation	22/09/2025 - 07:05
Air change rate, n[h^{-1}]	1.0	Preconditioning period	-
Air Velocity [m/s]	0.1	Chamber test period	23/09/2025 - 30/09/2025
Area specific ventilation rate, q [m/h or $m^3/m^2/h$]	1.0	Analytical test period	23/09/2025 - 09/10/2025
Relative humidity of supply air, RH [%]	50 ± 3	Exposed sample area [m^2]	0.990
Temperature of supply air, T [°C]	23 ± 1	Loading factor [m^2/m^3]	0.99
Background concentration of TVOC [$\mu g/m^3$]	< 20	Sample thickness [mm]	

4.2 Preparation of the Test Specimen

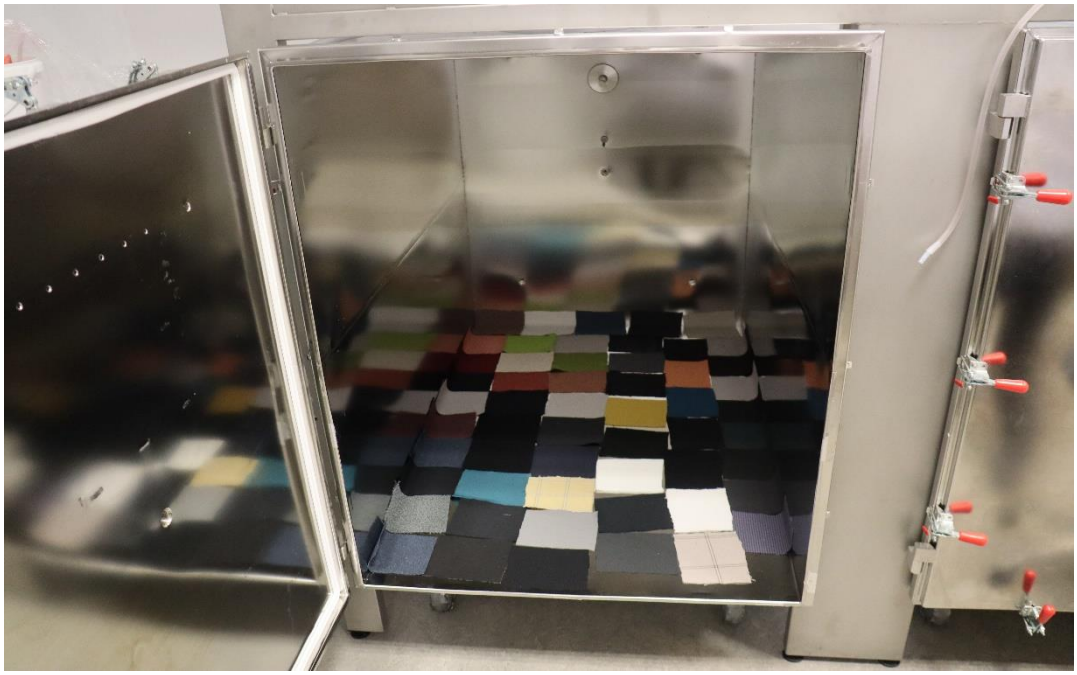
The fabrics were cut into 10*14 cm pieces and was transferred directly into the chamber.

Name	Item	Batch number
Amaze Loop	257260367	3709683172
Athlon	650060900	3716729154
Athlon Plus	650160900	3710795221
Atlantic	869060999	3712171108
Atlantic Screen	869768119	2412837391
Beyond Loop	257061163	3646479024
Blend	231601101	3717365022
Bond	247560097	3675228052
Chili	248863092	3719946025
Contour	257860998	3649923252
Contour Melange	257963145	3649924282
Cura	248060112	3716953125
Cura Loop	261567084	3706197111
Cura Screen	255762583	3719621192
Cyber	231501401	3724172011
Downtown	237901106	3724436011
Event	859860999	2408123554

Event Screen+	859960021	2417795391
Felicity	247760900	3702101041
Fighter	861060083	2433441207
Flex	869167031	2376694592
Future Loop	257260367	3618700061
Go Check	245060079	3716935282
Go Couture	244965085	3631671162
Go Uni	244860079	3707877152
Grain	228762122	3710654161
Harlequin	871460999	2507290591
Just	248960999	3700144241
Lense	650460106	3628497071
Medley	861363063	243137501
Mica	249767017	3719908031
Noma	250260999	3720022013
Omega	870660999	2508250147
Parcel Loop	231901601	3724065012
Renewed Loop	232666256	3720449012
Renewed Loop Screen	256966755	3663242061
Repetto	246302201	3719781011
Rhythm	871560000	2504210042
Rondo	250966201	3697157022
Runner	870560999	2508270182
Savoy	891460999	2502250012A
SoftNext	232801001	3722857012
Spin	250460999	3716826191
Step	244060004	3709033102
Step Melange	244260021	3716887094
Step Melange Screen	230763539	3660464211
Step Screen	230460404	3635566152
String	870860999	2507240318
Tale	232761283	3717868022
Tempt	891361168	244236711
Tonal	249060999	3716865191
Twist	244560999	3688606015

Twist Melange	244668119	3716890032
Uptown	238002213	3710813012
Web	246701101	3713813042

4.3 Picture of Sample



4.4 Deviations from Referenced Protocols and Regulations

The “Chain of custody” document was not supplied by the client and is consequently not contained in the report.

4.5 Air Samplings from the Test Chamber

Sampling media	Day (yyyy-mm-dd)	Time (hh:mm)	Volume [L]
3 Day, DNPH silicagel	2025-09-26	08:51 - 10:41	36
3 Day-Res, DNPH silicagel	2025-09-26	08:52 - 10:42	36
3 Day, Tenax TA	2025-09-26	08:53 - 09:52	5.2
3 Day-Res, Tenax TA	2025-09-26	09:53 - 10:42	2.3
7 Day, Tenax TA	2025-09-30	08:47 - 09:46	5.2
7 Day-Res, Tenax TA	2025-09-30	09:46 - 10:35	2.2
7 Day, DNPH silicagel	2025-09-30	08:46 - 10:34	35
7 Day-Res, DNPH silicagel	2025-09-30	08:46 - 10:34	35

4.6 VOC Emission Test Results after 3 and 7 Days

	CAS No.	Retention time [min]	ID-Cat	3 day conc. [µg/m³]	3 day SER [µg/(m²h)]	7 day conc. [µg/m³]	7 day SER [µg/(m²h)]
VOC Compounds							
None determined				< 2	< 2	< 2	< 2
TVOC toluene eq.				< 2	< 2	< 2	< 2
TVOC specific				< 2	< 2	< 2	< 2
Aldehydes							
Formaldehyde	50-00-0		1	< 3	< 3	< 3	< 3
Acetaldehyde	75-07-0		1	< 3	< 3	< 3	< 3

4.7 Results as Extrapolated to 14 Days VOC Emission

	CAS No.	Retention time [min]	ID-Cat	SER [µg/(m²h)]	Open plan [µg/m³]	Private office [µg/m³]
VOC Compounds						
None determined				< 2	< 2	< 2
TVOC toluene eq.				< 2	< 2	< 2
TVOC specific				< 2	< 2	< 2
Aldehydes						
Formaldehyde	50-00-0		1	< 2		
Acetaldehyde	75-07-0		1	< 2		

4.7.1 Calculation of Concentration after 14 Days

The emission rates (SER) after 3 and 7 days were extrapolated to 14 day emission rates using equation 8, 9, 10 given in ANSI/BIFMA M7.1-2011.

(8) $$E_{14} = a \cdot t_3^{-b}$$

(9) $$b = \frac{\ln E(t_1) - \ln E(t_2)}{\ln t_2 - \ln t_1}$$

(10) $$a = E(t_1) \cdot t_1^{\,b} = E(t_2) \cdot t_2^{\,b}$$

E_{14}= Emission rate after 14 days (336 hours)

t_1 = 3 days (72 hours), t_2 = 7 days (168 hours) and t_3 = 14 days (336 hours)

The emission rates as calculated after 14 days were used to calculate model room concentrations using the following formula:

$$C = \frac{A \cdot E}{Q}$$

with:
C Model room concentration, µg/m³
A Workstation surface area
Open plan: Panel area = 11.08 m², work surface area = 6.10 m², storage area = 4.57 m²
Private office: Panel area = 7.63 m², work surface area = 6.73 m², storage area = 10.55 m²
E Area specific emission factor, µg/(unit·h)
Q Ventilation rate, Open plan = 15.01 m³/h, private office = 34.67 m³/h

5 Summary and Evaluation of the Results

5.1 Comparison with Limit Values of ANSI/BIFMA; section 7.6.1

Parameter	Results after 7 days		
	Emission rate µg/(m²h)	Limit value, open plan µg/(m²h)	Limit value, private office µg/(m²h)
$TVOC_{toluene}$	< 2	< 345	< 694
4-Phenylcyclohexene	< 2	< 4.5	< 9.0
Formaldehyde	< 2	< 42.3	< 85.1
Total aldehydes (other)	< 1 µmol/(m²·h)	< 2.8 µmol/(m²·h)	< 5.7 µmol/(m²·h)

5.2 Comparison with Limit Values of ANSI/BIFMA; section 7.6.2

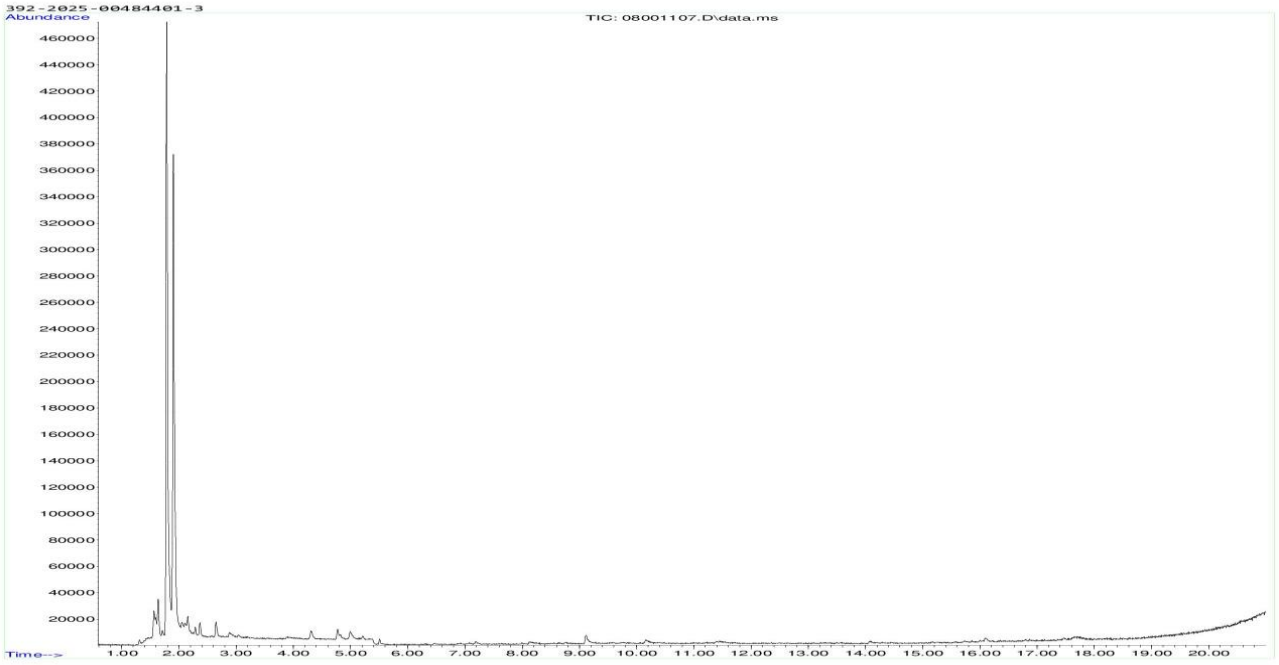
Individual compounds with CHREL-value after 14 days	**Complies**

5.3 Comparison with Limit Values of ANSI/BIFMA; section 7.6.3

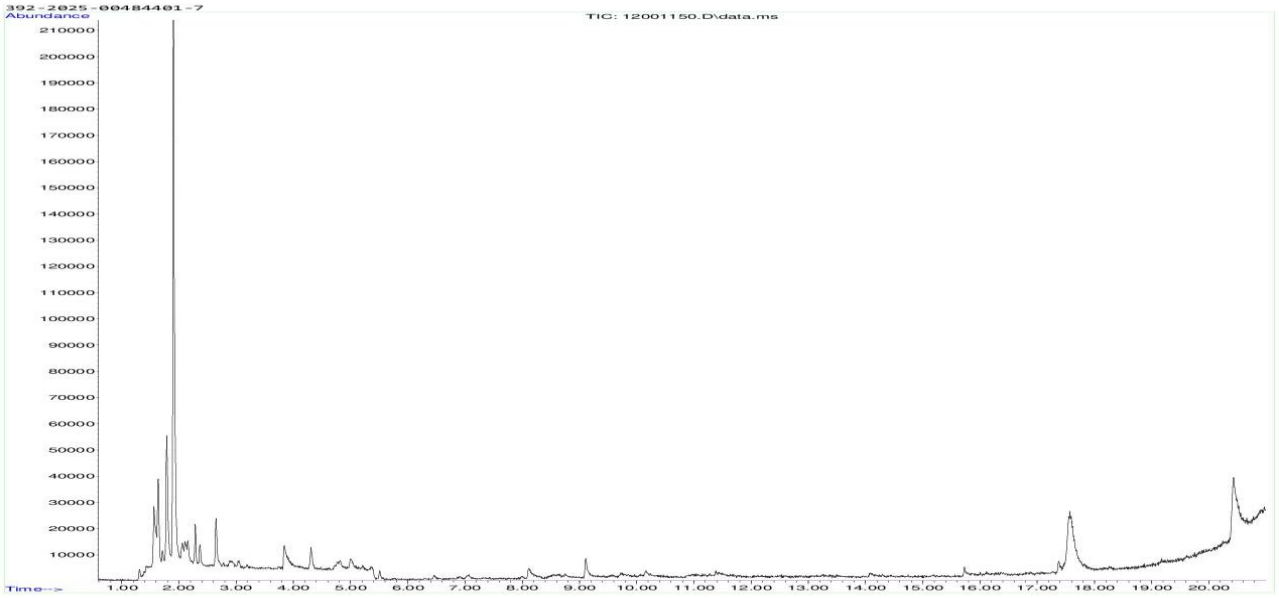
Parameter	Results after 14 days		
	Emission rate µg/(m²h)	Limit value, open plan µg/(m²h)	Limit value, private office µg/(m²h)
Formaldehyde	< 2	< 6.2	< 12.5

6 Appendices

6.1 Chromatogram of VOC Emissions after 3 Days



6.2 Chromatogram of VOC Emissions after 7 Days



Please consider the different scales.

6.3 How to Understand the Results

6.3.1 Acronyms Used in the Report

< Means less than

> Means bigger than (Tube/GC-MS overload)

* Not a part of our accreditation

¤ Um(%) is given as 2x RSD%. 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 wooden panels and is thus removed.

c The results have been corrected by the emission from wooden panels.

d 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.

SER Specific emission rate.

6.3.2 Explanation of ID Category

Categories of Identity:

1: Identified and specifically calibrated

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

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

4: Not identified, calibrated as toluene equivalent.

6.4 Description of VOC Emission Test

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

6.4.2 Expression of the Test Results

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

6.4.3 Testing of VOCs

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) (EN 16516, ISO 16000-6, internal methods no.: 71M549812 / 71M542808B).

The results of the individual substances are calculated in three groups depending on their retention time when analyzing using a non-polar column (HP-1):

- Volatile Organic Compounds (VOC) are defined as: All substances eluting between and including 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).

Total Volatile Organic Compounds (TVOC) is calculated by summation of all individual VOCs with a concentration ≥ 5 µg/m³. The TVOC can be expressed either in toluene equivalents as defined in EN 16516 and similar to ISO 16000-6, or as the sum of concentrations using specific or relative response factors. In the case of summation of concentrations using authentic or relative response factors, the toluene equivalent is applied to all non-target and non-identified VOCs before summing up. 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.

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).

6.4.4 Testing of Aldehydes

The presence of aldehydes after the specified duration of storage in the ventilated test chamber 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 (EN 16516, ISO 16000-3, VDI 3862 Blatt 3, internal methods no.: 71M549812 / 71M548400).

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.

6.4.5 Maximum Allowable Emission Factors

Below is given the maximum allowable emission factor after 14 days, as defined by BIFMA, for compounds with a CHREL value.

Compound	CAS nr.	Max allowable emission factor Open Plan µg/(m²h)	Max allowable emission factor Private office µg/(m²h)
Ethylbenzene	100-41-4	689	1392
Styrene	100-42-5	310	627
1,4-Dichlorobenzene	106-46-7	276	557
Epichlorohydrin	106-89-8	1.0	2.1
Ethylene glycol	107-21-1	138	278
1-Methoxy-2-propanol	107-98-2	2413	4874
Vinyl acetate	108-05-4	68.9	139
Toluene	108-88-3	103	209
Chlorobenzene	108-90-7	345	696
Phenol	108-95-2	68.9	139
2-Methoxyethanol	109-86-4	21	42
Ethylene glycol monomethyl ether acetate	110-49-6	31	63
n-Hexane	110-54-3	2413	4874
2-Ethoxyethanol	110-80-5	24	49
2-Ethoxyethyl acetate	111-15-9	103	209
1,4-Dioxane	123-91-1	1034	2089
Tetrachloroethylene	127-18-4	12.1	24.4
Formaldehyde	50-00-0	11	23
Isopropanol	67-63-0	2413	4874
Chloroform	67-66-3	103	209
N,N-Dimethyl Formamide	68-12-2	28	56
Benzene	71-43-2	21	42
1,1,1-Trichloroethane	71-55-6	345	696
Acetaldehyde	75-07-0	48	97
Methylene Chloride	75-09-2	138	278
Carbon Disulfide	75-15-0	276	557
Trichloroethylene	79-01-6	207	418
1-Methyl-2-Pyrrolidinone	872-50-4	110	223
Naphthalene	91-20-3	3	6
Xylenes (m-,o-, p-Xylene combined)	108-38-3, 95-47-6, 106-42-3	241	487

6.5 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 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.

6.6 Accreditation

The testing methods described above are accredited online 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.

Eurofins Product Testing Denmark A/S is notified body for the construction products regulation (EU) No 305/2011 with number NB 2657 under system 3.

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.

6.7 Uncertainty of the Test Method

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

6.8 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/

6.9 Version History

Report date	Report number	Modification
09/10/2025	392-2025-00484401_M_EN	Current version