BAM
Bundesanstalt für Materialforschung und -prüfung

Sicherheit in Technik und Chemie

UBA Conference
Limiting Health Impacts of Construction Products Regarding VOC

HARMONISED TEST STANDARD EN 16516 - COMMON APPROACH FOR ALL BUILDING PRODUCTS FOR INTERIORS

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BAM 4.2 „Materials and Air Pollutants“

TOPICS

- History and content of EN 16516
- Emission testing (chamber and analysis)
- The reference room
- Test results for evaluation of emissions

History of EN 16516

- **2005** Mandate M 366: Development of horizontal standardized assessment methods for harmonized approaches relating to dangerous substances
- **2011** Construction products regulation EU 305/2011: Requirements for Hygiene, Health, Environment
- **2013** CEN/TS 16516
- **2017** EN 16516 Constructions products – Assessment of release of dangerous substances – Determination of emissions into indoor air

???? Evaluation of construction products by VOC-classes or alternatives

Content of EN 16516 (1)

1. Scope
2. Normative references
3. Terms, definitions, abbreviations
4. Intended conditions of use, emission scenarios and European reference room
5. Product sampling and transport to the laboratory
6. Handling of product samples in the laboratory
7. **Test chamber conditions**
8. **Determination of vapour-phase organic compounds in test chamber air**
9. **Calculation of specific emission rates and expression of results at the reference room**
10. **Reporting for the horizontal test method**
11. Indirect methods

Content of EN 16516 (2)

Annex A: Repeatability and reproducibility
Annex B: Examples of indirect methods
Annex C: Information on very volatile organic compound (VVOC) testing
Annex D: Examples of a form for a sampling report
Annex E: Example form for a chain of custody report
Annex F: Benzene artefact generation on Tenax
Annex G: List of non-carcinogenic VOCs
Annex H: List of carcinogenic VOCs

Scope of EN 16516

This European Standard specifies a horizontal reference method for the determination of emissions of regulated dangerous substances from construction products into indoor air.

This method is applicable to volatile organic compounds, semi-volatile organic compounds, and very volatile aldehydes.

It is based on the use of a test chamber and subsequent analysis of the organic compounds by GC-MS or HPLC.

Emission Testing
Definitions

Category		Boiling point	**EN 16516 Retention time (GC)**
VVOC	very volatile organic compound	< 0 to 50-100°C	< n-hexane (C_6)
VOC	volatile organic compound	50-100 to 240-260°C	n-hexane to n-hexadecane
SVOC	semi-volatile organic compounds	240-260 to 380-400°C	> n-hexadecane (C_{16})

Emission Testing
Basics

- Testing in emission test chambers
- Definition of size, air change rate, loading factor, climate, testing time
- Determination of air concentrations c [µg/m³]
- Calculation of area specific emission rates SER_A [µg/m²h]

Air change rate AC [1/h], Loading factor L [m²/m³],
Climate [50% r.h., 23°C], Testing time (28 days)
$SER_A = c \times AC/L$ [µg/m²h]

Emission test chamber measurement
1 m³, 250 L, 23 L

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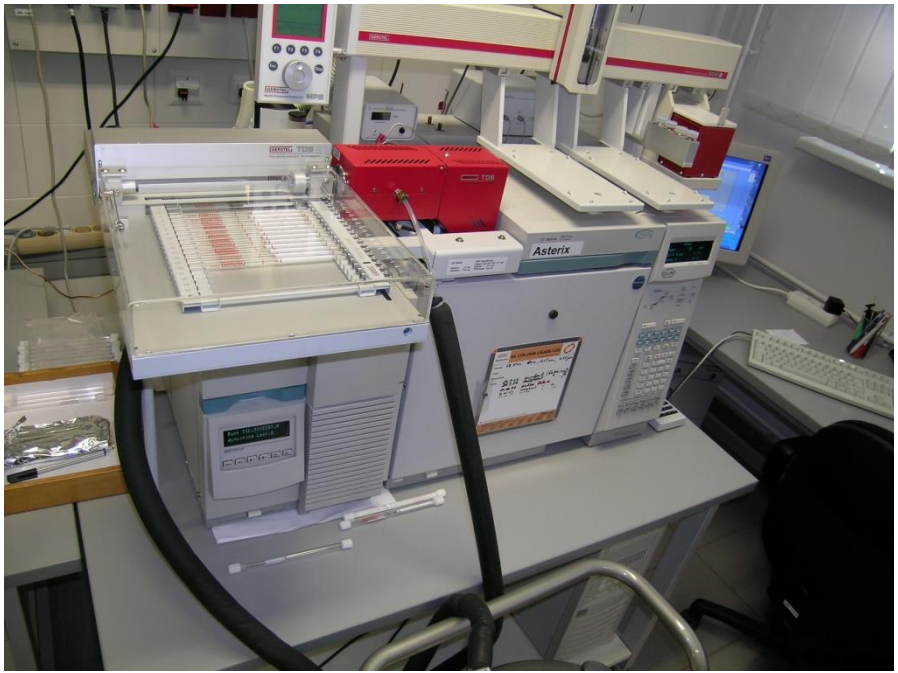
Emission test chamber measurement
Analytical equipment



Sampling on adsorption tubes
Thermal desorption (TDS)
Analysis by GC-MS

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Emission test chamber measurement
Analytical equipment

Sampling on DNPH cartridges
Extraction with Acetonitrile
Analysis by HPLC-UV

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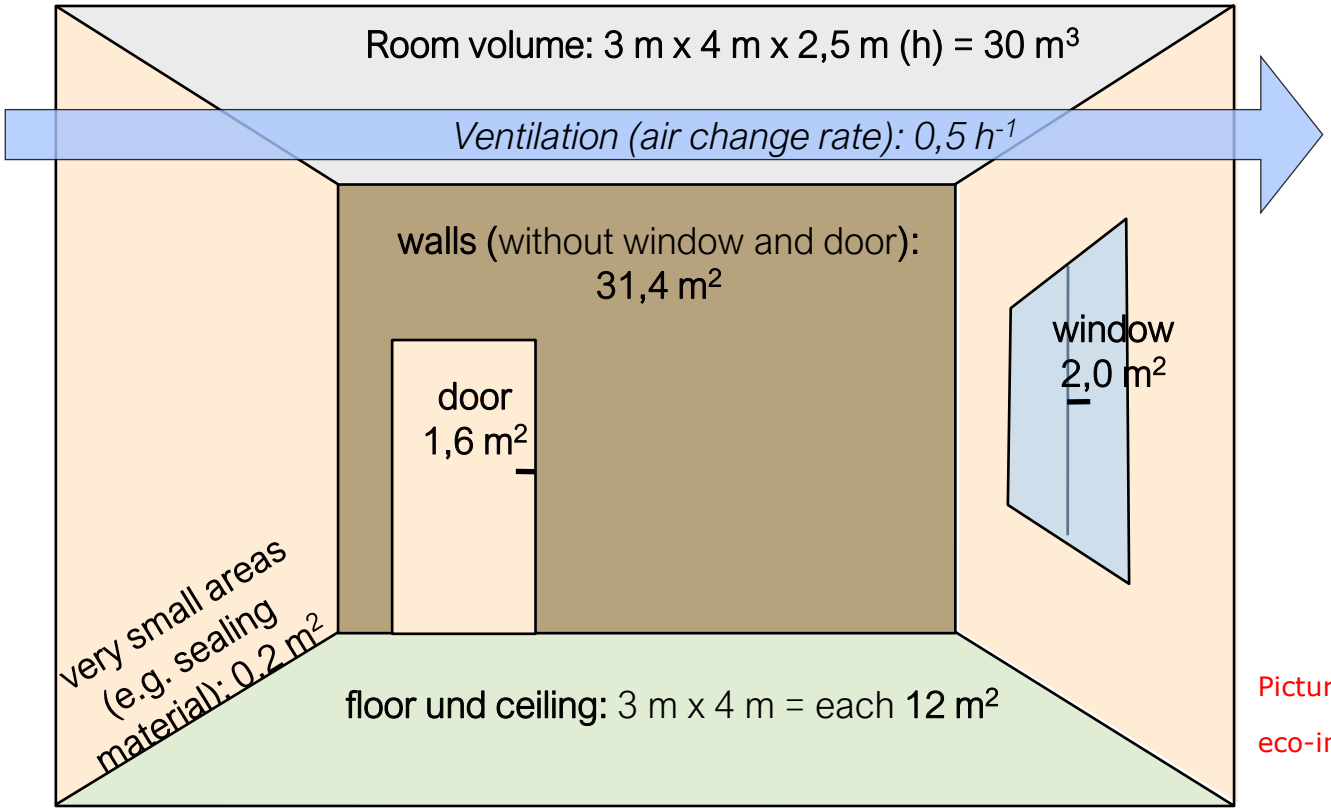
The Reference Room



Picture by Frank Kübart, eco-institute, Cologne

The Reference Room

	loading factor [m²/m³]	air change rate [1/h]	area specifc air flow rate [m³/m²h]
floor and ceiling	0.4	0.5	1.25
wall	1.0	0.5	0.5
small surfaces	0.05	0.5	10
very small surfaces	0.007	0.5	71

Emission Testing
Results

- Identified target compounds
- Identified non-target compounds
- Unidentified compounds
- Volatile carcinogens
- TVOC
- TSVOC
- R value(s) based on (a) specified LCI list(s)

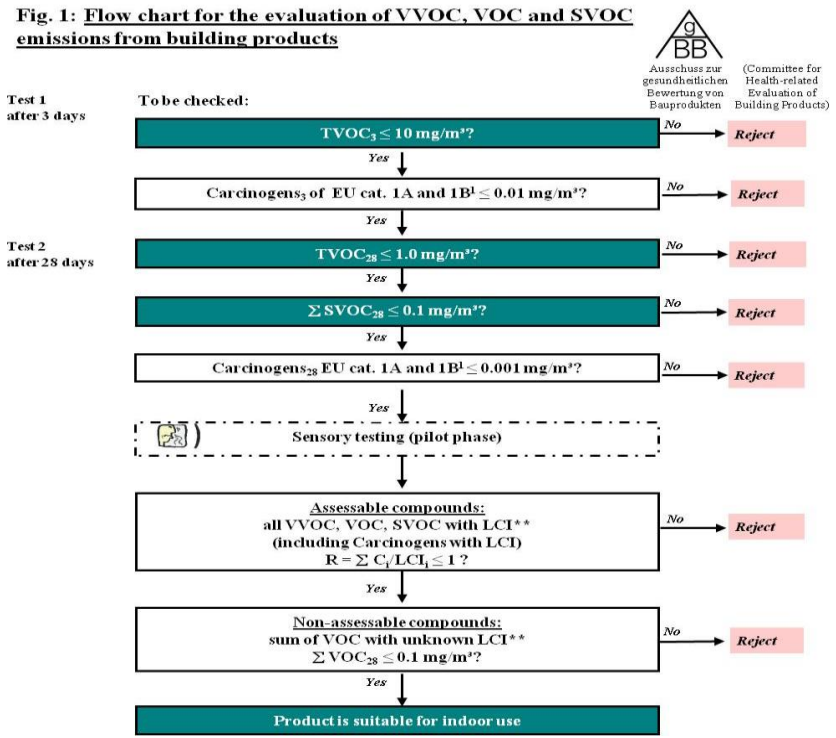
Emission Testing
National regulations, e.g. German AgBB-scheme

1. to **assess all detected single substances for toxicological relevance**
- identify and quantify VOC
- apply LCI values
- identify carcinogens

2. to **limit the total amount of emissions**
- TVOC, TSVOC

3. to **limit unassessable/unidentified substances**
- precautionary principle
- $VOC_{without\ LCI}$

4. since 2015 **consideration of some VVOC** using LCI concept



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SUMMARY

- EN 16516 enables the standardized measurement of chemical emissions from construction products into indoor air
- EN 16516 is in force since 2018
- A consistent European health evaluation of construction products is still not established
- A European evaluation procedure is needed to ensure good indoor air quality

???? Evaluation of construction products by VOC-classes or alternatives

The End

Thank you for your attention!

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