



SLOVENSKI STANDARD
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Notranji zrak - 9. del: Določevanje emisije hlapnih organskih spojin iz gradbenih proizvodov in opreme - Metoda s preskusno komoro (ISO/DIS 16000-9:2023)

Indoor air - Part 9: Determination of the emission of volatile organic compounds from building products and furnishing - Emission test chamber method (ISO/DIS 16000-9:2023)

Innenraumluftverunreinigungen - Teil 9: Bestimmung der Emission von flüchtigen organischen Verbindungen aus Bauprodukten und Einrichtungsgegenständen - Emissionsprüfkammer-Verfahren (ISO/DIS 16000-9:2023)

Air intérieur - Partie 9: Dosage de l'émission de composés organiques volatils de produits de construction et d'objets d'équipement - Méthode de la chambre d'essai d'émission (ISO/DIS 16000-9:2023)

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Indoor air —

Part 9:

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

Air intérieur —

Partie 9: Dosage de l'émission de composés organiques volatils de produits de construction et d'objets d'équipement — Méthode de la chambre d'essai d'émission

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 6, *Indoor air*.

This second edition cancels and replaces the first edition (ISO 16000-9:2011), which has been technically revised.

The main changes compared to the previous edition are as follows:

- detailed information about cut edge and temperature effects has been added.

A list of all parts in the ISO 16000 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The determination of volatile organic compounds (VOCs) emitted from building products using emission test chambers in conjunction with the standardised sampling, storage of samples and preparation of test specimens has objectives such as:

- to provide manufacturers, builders, and end users with emission data useful for the evaluation of the impact of building products on the indoor air quality;
- to promote the development of improved products.

The method can in principle be used for most building products used indoors.

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Indoor air —

Part 9:

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

1 Scope

This document specifies a general laboratory test method for determination of the area specific emission rate of volatile organic compounds (VOCs) from newly produced building products or furnishing under defined climate conditions. The method can also, in principle, be applied to aged products. The emission data obtained can be used to calculate concentrations in a model room.

This document applies to various emission test chambers used for determination of the emission of volatile organic compounds from building products or furnishing.

Sampling, transport and storage of materials to be tested, and preparation of test specimens are described in ISO 16000-11. Air sampling and analytical methods for the determination of VOCs are described in ISO 16000-6 and ISO 16017-1^[1].

A general description of an emission test chamber is given in [Annex C](#).

For the determination of formaldehyde emissions from wood-based panels, refer to EN 717-1^[2]. However, this document is also applicable to wood-based panels and other building products, in order to determine the emission rate of formaldehyde. The measurement procedure for formaldehyde is described in ISO 16000-3^[3].

Note In principle this document can be applied to the study of any gas phase emissions from building products and furnishing.

The determination of the emission rates of cut edges is described in [Annex D](#).

Evaluation of the impact of underfloor heating (Ondol) on emissions is described in Annex E.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 16000-6:2004, *Indoor air — Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA[®] sorbent, thermal desorption and gas chromatography using MS/FID*

ISO 16000-11:2006, *Indoor air — Part 11: Determination of the emission of volatile organic compounds from building products and furnishing — Sampling, storage of samples and preparation of test specimens*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1
air change rate
ratio of the volume of clean air brought into the emission test chamber per hour and the free emission test chamber volume measured in identical units

3.2
air flow rate
air volume entering into the emission test chamber per time

3.3
air velocity
air speed over the surface of the test specimen

3.4
area specific air flow rate
ratio between the supply air flow rate and the area of the test specimen

3.5
building product
product produced for incorporation in a permanent manner in construction works

3.6
emission test chamber
enclosure with controlled operational parameters for the determination of volatile organic compounds emitted from building products

3.7
emission test chamber concentration
concentration of a specific volatile organic compound, VOC_x , (or group of volatile organic compounds) measured in the emission test chamber outlet

3.8
product loading factor
ratio of exposed surface area of the test specimen and the free emission test chamber volume

3.9
recovery
measured mass of a target volatile organic compound in the air leaving the emission test chamber during a given time period divided by the mass of target volatile organic compound added to the emission test chamber in the same time period, expressed in percent

Note 1 to entry: The recovery provides information about the performance of the entire method.

3.10
sample
part or piece of a building product that is representative of the production

3.11
specific emission rate
 q_m
product specific rate describing the mass of a volatile organic compound emitted from a product per time at a given time from the start of the test

Note 1 to entry: Area specific emission rate, q_A , is used in this part of ISO 16000. Several other specific emission rates can be defined according to different requirements, e.g. length specific emission rate, q_l , volume specific emission rate, q_v , and unit specific emission rate, q_u .

Note 2 to entry: The term "area specific emission rate" is sometimes used in parallel with the term "emission factor".

3.12

target volatile organic compound

product specific volatile organic compound

3.13

test specimen

part of the sample specially prepared for emission testing in an emission test chamber in order to simulate the emission behaviour of the material or product that is tested

3.14

total volatile organic compound

TVOC

sum of the concentrations of identified and unidentified volatile organic compounds eluting between and including *n*-hexane and *n*-hexadecane.

Note 1 to entry: For quantification of the identified compounds, their individual response is used. The areas of the unidentified peaks are converted on molecular mass basis to concentrations using the toluene response factor^[4].

Note 2 to entry: Due to practical reasons to be taken into account for test chambers, this definition differs slightly from that defined in ISO 16000-6:2004, where TVOC are related to the sampling medium Tenax TA^{®1)} on which the TVOC are adsorbed.

3.15

volatile organic compound

VOC

organic compound that is emitted from the test specimen and all those detected in the chamber outlet air

Note 1 to entry: Due to practical reasons to be taken into account for test chambers, this definition differs from that defined in ISO 16000-6:2004, where the definition is based on the boiling point range (50 °C to 100 °C) to (240 °C to 260 °C).

Note 2 to entry: The emission test method described in this document is optimum for the range of compounds specified by the definition of total volatile organic compounds (TVOC).

4 Symbols and abbreviated terms

The symbols and the abbreviated terms used in this document are given below.

Symbol	Meaning	Unit
ρ_x	mass concentration of a VOC _x in the emission test chamber	micrograms per cubic metre ($\mu\text{g}/\text{m}^3$)
L	product loading factor	square metres per cubic metre (m^2/m^3)
n	air change rate	changes per hour (h^{-1})
q	area specific air flow rate ($= n/L$)	cubic metres per square metre and hour ($\text{m}^3/(\text{m}^2 \cdot \text{h})$)
E_a	area specific emission rate	micrograms per square metre and hour ($\mu\text{g}/(\text{m}^2 \cdot \text{h})$)
E_l	length specific emission rate	micrograms per metre and hour ($\mu\text{g}/(\text{m} \cdot \text{h})$)
E_m	mass specific emission rate	micrograms per gram and hour ($\mu\text{g}/\text{g} \cdot \text{h})$)
E_v	volume specific emission rate	micrograms per cubic metre and hour ($\mu\text{g}/(\text{m}^3 \cdot \text{h})$)
E_u	unit specific emission rate	micrograms per unit and hour ($\mu\text{g}/(\text{u} \cdot \text{h})$)
t	time after start of the test	hours or days (h, d)

1) Tenax TA[®] is the trade name of a product manufactured by Supelco, Inc. This information is given for the convenience of users of this part of ISO 16000 and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.