INTERNATIONAL STANDARD

ISO 16000-6

Third edition
2021-08

Indoor air —

Part 6: Determination of organic compounds (VVOC, VOC, SVOC) in indoor and test chamber air by active sampling on sorbent tubes, thermal desorption and gas chromatography using MS or MS FID

Air intérieur —

Partie 6: Dosage des composés organiques (COTV, COV, COSV) dans l'air intérieur et l'air de chambre d'essai par prélèvement actif sur tubes à sorbant, désorption thermique et chromatographie en phase gazeuse avec détection MS ou MS-FID

Reference number
ISO 16000-6:2021(E)

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Published in Switzerland

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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 third edition cancels and replaces the second edition (ISO 16000-6:2011), which has been technically revised. The main changes compared to the previous edition are as follows:

— other sorbents than Tenax TA® are allowed to be used;

— descriptions of VVOC and SVOC measurements are included in the mandatory part of the document.

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.

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Introduction

ISO 16000-1 establishes general requirements relating to the measurement of indoor air pollutants and the important conditions to be observed before or during the sampling of individual pollutants or groups of pollutants. Aspects of the determination (sampling and analysis) and the sampling strategy of specific pollutants or groups of pollutants are specified in the subsequent parts of ISO 16000 (see Foreword).

ISO 16000-5 (dealing with VOC sampling strategy) is a link between ISO 16000-1 (a generic standard establishing the principles) and this part of ISO 16000, which deals with sampling and analytical measurements.

ISO 16017 (see Clause 2 and Reference [8]) and ISO 12219 [3]-[7] also focus on measuring vapour-phase organic chemicals in air.

This document can be applied to measure vapour phase organic compounds in indoor environments that include buildings with varying designs and purposes and cabins for different modes of transport, as well as measurement in product emission test chambers. These measurements can be for a range of purposes as described in ISO 16000-1 and ISO 16000-5, therefore the requirement for the measurement may be well defined by the task descriptor or may be quite open. For example, the task may be to determine a specific list of target chemicals with a defined sampling time and sensitivity of measurement or it may be to investigate the cause of a reported and poorly understood indoor air quality problem. Depending upon the task of measurement the user of this document should select the most appropriate sampling and analytical instrumentation and conditions. This document provides that information in the normative part combined with informative guidance. Figure 1 refers to the most critical parts of the standard with regard to selection of the most appropriate methodology for the task to be undertaken. Tenax TA®[1)] only or multisorbents can be used to capture ranges of vapour phase organic compounds. Multisorbents are used for wider ranges and may improve recovery of compounds.

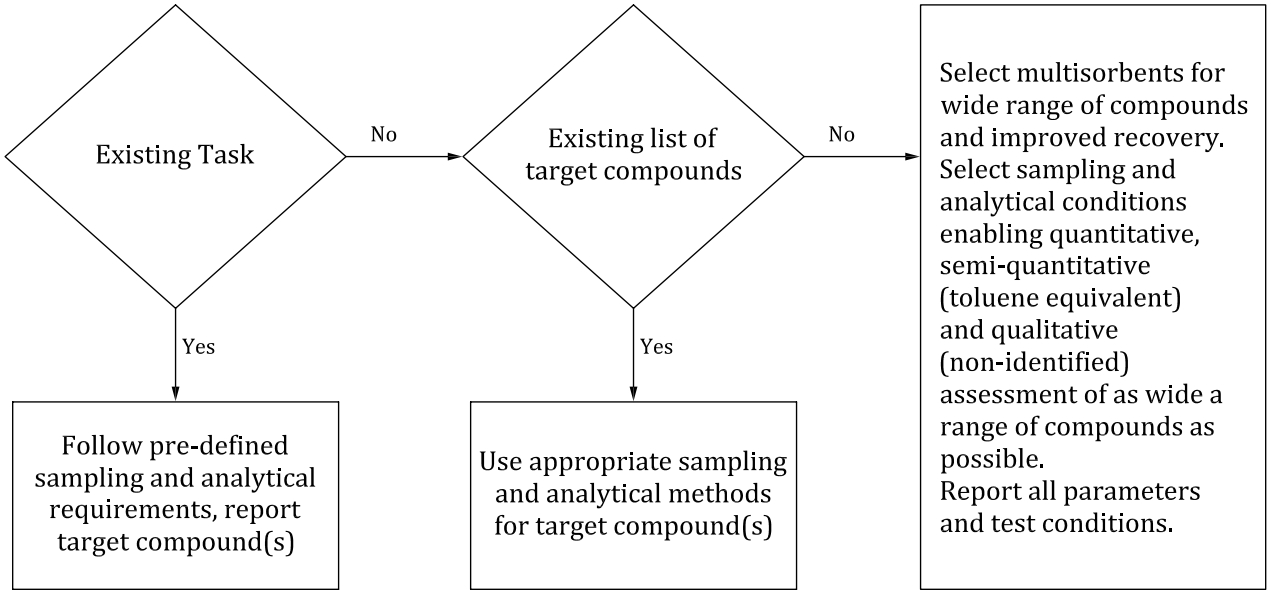


Figure 1 — Measurement scheme showing different ways of analysing air samples depending on the respective task including target compounds

1) Tenax TA® is a trade name of a product supplied by Buchem. This information is given for the convenience of users of this document 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.

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Indoor air —

Part 6: Determination of organic compounds (VVOC, VOC, SVOC) in indoor and test chamber air by active sampling on sorbent tubes, thermal desorption and gas chromatography using MS or MS FID

1 Scope

This document specifies a method for determination of volatile organic compounds (VOC) in indoor air and in air sampled for the determination of the emission from products or materials used in indoor environments (according to ISO 16000-1) using test chambers and test cells. The method uses sorbent sampling tubes with subsequent thermal desorption (TD) and gas chromatographic (GC) analysis employing a capillary column and a mass spectrometric (MS) detector with or without an additional flame ionisation detector (FID)[13].

The method is applicable to the measurement of most GC-compatible vapour-phase organic compounds at concentrations ranging from micrograms per cubic metre to several milligrams per cubic metre. Many very volatile organic compounds (VVOC) and semi-volatile organic compounds (SVOC) can be analysed depending on the sorbents used.

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 16000-1, *Indoor air — Part 1: General aspects of sampling strategy*

EN 13137, *Workplace atmospheres – Pumps for personal sampling of chemical and biological agents – Requirements and test methods*

3 Terms and definitions

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

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
semi-volatile organic compound
SVOC
organic compound eluting after n-hexadecane on a gas chromatographic column specified as a 5 % phenyl 95 % methyl polysiloxane phase capillary gas chromatographic column

Note 1 to entry: The vapour-fraction of SVOC ranging in volatility to n-C_{44} can also be analysed by thermal desorption GC-MS but requires specific sampling and analytical conditions for optimum performance [22,25].

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3.2
volatile organic compound
VOC
organic compound eluting between and including n-hexane and n-hexadecane on a gas chromatographic column specified as a 5 % phenyl 95 % methyl polysiloxane phase capillary gas chromatographic column

3.3
very volatile organic compound
VVOC
organic compound eluting before n-hexane on a gas chromatographic column specified as 5 % phenyl 95 % methyl polysiloxane phase capillary gas chromatographic column

3.4
total volatile organic compounds
TVOC
sum of the concentration of the identified and unidentified *volatile organic compounds* (3.2) calculated as detailed in Annex A

3.5
total semi-volatile organic compounds
TSVOC
sum of the concentrations of identified and unidentified *semi-volatile organic compounds* (3.1) and calculated as detailed in Annex A

Note 1 to entry: The limit of volatility of SVOCs included in the TSVOC sum may be defined by the specific task list.

3.6
target compound
individual vapour phase compound in indoor air with a concentration determined quantitatively and reported as a result of this method

3.7
task list
specific list of requirements for sampling and analysis defined prior to testing and reflected in the reporting of the results

Note 1 to entry: The requirements may include a specific target list with or without associated limit criteria, and/or require investigations of unknowns. They may also include particular control of aspects such as the location, duration and frequency of sampling.

3.8
laboratory blank
conditioned sorbent tube from the batch selected for each sampling exercise, retained in the laboratory, sealed with long term storage caps throughout the sampling exercise to be used as a blank tube

Note 1 to entry: These tubes are analysed with the sampled tubes.

3.9
field blank
conditioned sorbent tube from the batch used for the sampling exercise, subjected to the same handling procedure in the field as the sample tubes, including removal and replacement of storage caps, but not used for sample collection

3.10
internal standard
compound of known concentration added to a sample to facilitate the qualitative identification and/or quantitative determination of the sample components

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