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Indoor air —

Part 29: Test methods for VOC detectors

Air intérieur —

Partie 29: Méthodes d'essai pour détecteurs de composés organiques volatils (COV)

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 146, *Air quality*, Subcommittee SC 6, *Indoor air*.

ISO 16000 consists of the following parts, under the general title *Indoor air*:

— *Part 1: General aspects of sampling strategy*

— *Part 2: Sampling strategy for formaldehyde*

— *Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air — Active sampling method*

— *Part 4: Determination of formaldehyde — Diffusive sampling method*

— *Part 5: Sampling strategy for volatile organic compounds (VOCs)*

— *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 or MS-FID*

— *Part 7: Sampling strategy for determination of airborne asbestos fibre concentrations*

— *Part 8: Determination of local mean ages of air in buildings for characterizing ventilation conditions*

— *Part 9: Determination of the emission of volatile organic compounds from building products and furnishing — Emission test chamber method*

— *Part 10: Determination of the emission of volatile organic compounds from building products and furnishing — Emission test cell method*

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

— *Part 12: Sampling strategy for polychlorinated biphenyls (PCBs), polychlorinated dibenzo-*p*-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and polycyclic aromatic hydrocarbons (PAHs)*

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— *Part 13: Determination of total (gas and particle-phase) polychlorinated dioxin-like biphenyls (PCBs) and polychlorinated dibenzo-*p*-dioxins/dibenzofurans (PCDDs/PCDFs) — Collection on sorbent-backed filters*

— *Part 14: Determination of total (gas and particle-phase) polychlorinated dioxin-like biphenyls (PCBs) and polychlorinated dibenzo-*p*-dioxins/dibenzofurans (PCDDs/PCDFs) — Extraction, clean-up and analysis by high-resolution gas chromatography and mass spectrometry*

— *Part 15: Sampling strategy for nitrogen dioxide (NO_2)*

— *Part 16: Detection and enumeration of moulds — Sampling by filtration*

— *Part 17: Detection and enumeration of moulds — Culture-based method*

— *Part 18: Detection and enumeration of moulds — Sampling by impaction*

— *Part 19: Sampling strategy for moulds*

— *Part 20: Detection and enumeration of moulds — Determination of total spore count*

— *Part 21: Detection and enumeration of moulds — Sampling from materials*

— *Part 23: Performance test for evaluating the reduction of formaldehyde concentrations by sorptive building materials*

— *Part 24: Performance test for evaluating the reduction of volatile organic compound (except formaldehyde) concentrations by sorptive building materials*

— *Part 25: Determination of the emission of semi-volatile organic compounds by building products — Micro-chamber method*

— *Part 26: Sampling strategy for carbon dioxide (CO_2)*

— *Part 27: Determination of settled fibrous dust on surfaces by (SEM) scanning electron microscopy (direct method)*

— *Part 28*: *Determination of odour emissions from building products using test chambers*

— *Part 29: Test methods for VOC detectors*

— *Part 30: Sensory testing of indoor air*

— *Part 31: Measurement of flame retardants and plasticizers based on organophosphorus compounds — Phosphoric acid ester*

— *Part 32: Investigation of buildings for pollutants and other injurious factors — Inspections*

The following parts are under preparation:

— *Part 33: Determination of phthalates with gas chromatography/mass spectrometry (GC-MS)*

— *Part 34: Strategies for the measurement of airborne particles (PM 2,5 fraction)*

— *Part 35: Measurement of polybrominated diphenylether, hexabromocyclododecane and hexabromobenzene*

— *Part 36: Test method for the reduction rate of airborne bacteria by air purifiers using a test chamber*

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Introduction

Volatile organic compounds (VOCs) of indoor air diffuse from building materials, bounding agents, furniture, pesticides, and other sources. In such a situation, VOC detectors are expected to be widely used for screening, monitoring indoor VOC concentrations, locating sources, controlling ventilation systems, and so on. Therefore, it is desirable to use highly sensitive VOC detectors that can detect a range of VOCs within a building. Reflecting the situation as such, several VOC detectors are commercially available. This part of ISO 16000 contains important quantitative and technical specifications for VOC testing methods intended to improve the reliability of the VOC detection and realize broader use of VOC detectors.

ISO 16017,[1][2] ISO 12219,[3][4][5][6][7] and ISO 16000-6[9] also focus on volatile organic compound (VOC) measurements.

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Indoor air —

Part 29: Test methods for VOC detectors

1 Scope

This part of ISO 16000 specifies test methods of the performance of VOC detectors that are designed to monitor indoor and living atmosphere VOC concentration as well as to control indoor air quality in portable, mobile, and remote applications. The provisions in this part of ISO 16000 cover VOCs detectors as well as detectors for individual VOCs. This part of ISO 16000 sets out only the requirements applicable to a test method of VOC detectors such as response time, stability, and measuring range.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61000-4-1, *Electromagnetic compatibility (EMC) — Part 4-1: Testing and measurement techniques — Overview of IEC 61000-4 series*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test*

3 Terms and definitions

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

3.1
aspirated VOC detector
VOC detectors in which test gas is presented to the VOC sensor(s) in a forced manner (e.g. using a gas sampling pump with a pressure differential to induce test gas flow)

3.2
clean air
air that is free of detectable impurities

Note 1 to entry: For the purposes of this part of ISO 16000, the impurities are VOC, flammable gas, and interfering gas.

3.3
diffusion type VOC detector
VOC detector in which the transfer of VOC gas from the atmosphere to the gas sensor takes place by random molecular movement, i.e. under conditions in which there is no aspirated flow

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3.4
final indication
adjudged or displayed stable indication

Note 1 to entry: For the purposes of this part of ISO 16000, indication is a VOC concentration provided by a VOC detector.

3.5
VOC detector
assembly with an integrated or a remote VOC sensor that is intended to monitor VOCs

3.6
VOC sensing element
component of a VOC sensor that responds to variation in VOC concentration

3.7
VOC sensor
assembly, which contains the VOC sensing element and can also contain circuit components associated with the VOC sensing element

3.8
interferent
any substance that adversely affects the detection accuracy

Note 1 to entry: For the purposes of this part of ISO 16000, detection accuracy is for final indication of a VOC detector.

3.9
poisoning
phenomenon caused by any interferent that permanently affects the sensitivity of a sensing element

Note 1 to entry: For the purposes of this part of ISO 16000, the sensing element is used for a VOC detector.

3.10
stabilization
state in which three successive readings of a VOC detector indicate no change greater than 10 % of the concentration of the test gas

3.11
test gas
mixture of clean air with a known concentration of one or more VOCs

Note 1 to entry: For the purposes of this part of ISO 16000, test gas is used for performance testing of a VOC detector.

3.12
volatile organic compound
VOC
organic compound whose boiling point is in the range from (50 °C to 100 °C) to (240 °C to 260 °C)

Note 1 to entry: This classification has been defined by the World Health Organization.

Note 2 to entry: Boiling points of some compounds are difficult or impossible to determine because they decompose before they boil at atmospheric pressure. Vapour pressure is another criterion for classification of compound volatility that can be used for classification of organic chemicals.

3.13
warm-up time
time interval between the time when the apparatus is switched on and the time when the apparatus is ready to measure

Note 1 to entry: For the purposes of this part of ISO 16000, the apparatus is a VOC detector.

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