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**Indoor air —**

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

*Air intérieur —*

*Partie 23: Essai de performance pour l'évaluation de la réduction des  
concentrations en formaldéhyde par des matériaux de construction  
sorptifs*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16000-23 was prepared by Technical Committee 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 — 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<sup>®</sup> sorbent, thermal desorption and gas chromatography using 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)*
- *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<sub>2</sub>)*
- *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 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 compounds (except formaldehyde) concentrations by sorptive building materials*
- *Part 25: Determination of the emission of semi-volatile organic compounds by building products — Micro-chamber method*

The following parts are under preparation:

- *Part 19: Sampling strategy for moulds*
- *Part 26: Measurement strategy for carbon dioxide (CO<sub>2</sub>)*
- *Part 28: Sensory evaluation of emissions from building materials and products*

The following parts are planned:

- *Part 20: Detection and enumeration of moulds — Sampling from house dust*
- *Part 21: Detection and enumeration of moulds — Sampling from materials*
- *Part 22: Detection and enumeration of moulds — Molecular methods*
- *Part 27: Standard method for the quantitative analysis of asbestos fibres in settled dust*
- *Part 30: Sensory testing of indoor air*

Furthermore

- ISO 12219-1, *Indoor air — Road vehicles — Part 1: Whole vehicle test chamber — Specification and method for the determination of volatile organic compounds in car interiors* [planned document]
- ISO 16017-1, *Indoor, ambient and workplace air — Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography — Part 1: Pumped sampling*
- ISO 16017-2, *Indoor, ambient and workplace air — Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography — Part 2: Diffusive sampling*

focus on volatile organic compound (VOC) measurements.

## Introduction

Sorptive building materials have been marketed in the form of sheet and board products for removing airborne pollutants via physical sorption or chemical reaction.

Harmonized test methods for evaluating sorptive effects are important for comparative assessment of the performance of sorptive building materials that are used for reducing levels of indoor air contaminants.

This part of ISO 16000 specifies procedures for evaluating the performance of sorptive building materials for reducing indoor air formaldehyde concentrations over time.

The performance of sorptive building materials is evaluated by sorption flux and saturation mass per area and is affected by a number of factors. Specific test conditions are therefore defined in this part of ISO 16000.

This part of ISO 16000 can be applied to most sorptive building materials used indoors and for formaldehyde as an indoor air contaminant.

This part of ISO 16000 is based on the test chamber method as specified in ISO 16000-9.

## Indoor air —

### Part 23:

## Performance test for evaluating the reduction of formaldehyde concentrations by sorptive building materials

### 1 Scope

This part of ISO 16000 specifies a general laboratory test method for evaluating the reduction of formaldehyde concentrations by sorptive building materials. This method applies to boards, wallpapers, carpets, paint products, and other building materials. The sorption of formaldehyde can be brought about by adsorption, absorption and chemisorption. The performance of the material with respect to its ability to reduce the concentration of formaldehyde in indoor air is evaluated by measuring sorption flux and saturation mass per area. The former directly indicates material performance with respect to formaldehyde concentration reduction at a point in time; the latter relates to the ability of a product to maintain that performance.

The method specified in this part of ISO 16000 employs formaldehyde-spiked supply air to determine the performance of building materials in reducing formaldehyde concentrations. The characteristics of formaldehyde sorption depend greatly on humidity. Formaldehyde is less stable in air than other volatile organic compounds (VOCs), so it has to be tested on its own.

This part of ISO 16000 is based on the test chamber method specified in ISO 16000-9. Sampling, transport and storage of materials to be tested and preparation of test specimens are specified in ISO 16000-11. Air sampling and analytical methods for the determination of formaldehyde are specified in ISO 16000-3, which is part of the complete procedure.

### 2 Normative references

The following referenced documents are indispensable for the application 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, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 6353-3, *Reagents for chemical analysis — Part 3: Specifications — Second series*

ISO 16000-3, *Indoor air — Part 3: Determination of formaldehyde and other carbonyl compounds — Active sampling method*

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

ISO 16000-9:2006, *Indoor air — Part 9: Determination of the emission of volatile organic compounds from building products and furnishing — Emission test chamber method*

ISO 16000-11, *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*