BS ISO 16000-28:2012

BSI Standards Publication

Indoor air

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

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National foreword

This British Standard is the UK implementation of ISO 16000-28:2012.

The UK participation in its preparation was entrusted to Technical Committee EH/2/3, Ambient atmospheres.

A list of organizations represented on this committee can be obtained on request to its secretary.

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ISBN 978 0 580 66606 3

ICS 13.040.20

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2012.

Amendments issued since publication

Date	Text affected

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INTERNATIONAL STANDARD

ISO 16000-28

First edition
2012-03-15

Indoor air —

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

Air intérieur —

Partie 28: Détermination des émissions d'odeurs des produits de construction au moyen de chambres d'essai

Reference number
ISO 16000-28:2012(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.

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 16000-28 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 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)*

— *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 (NO2)*

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

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— *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 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 (CO2)*

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

The following parts are under preparation:

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

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

— *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 constructions on pollutants and other injurious factors — Inspections*

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Introduction

Odour evaluation is a complementary method to the chemical testing of emissions from building products.

The determination of odour acceptability, intensity and hedonic tone, and intensity of emissions from building products using test chambers has objectives such as:

— to provide manufacturers, builders, and end users with data useful for the evaluation of the odour impact of building products on the indoor air quality;

— to promote the development of improved products.

The method can also be used for building furnishings.

ISO 16017[31] [32] and ISO 12219[26]–[30] focus on volatile organic compound (VOC) measurements.

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INTERNATIONAL STANDARD ISO 16000-28:2012(E)

Indoor air —

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

1 Scope

This part of ISO 16000 specifies a laboratory test method using test chambers defined in ISO 16000-9 and evaluation procedures for the determination of odours emitted from newly produced building products under defined climate conditions. The method can also, in principle, be applied to aged products. This part of ISO 16000 is applicable to various test chambers used for the determination of emissions from building products.

NOTE This part of ISO 16000 can also be used for other products or materials.

Sampling, transport and storage of materials under test, as well as preparation of test specimens are described in ISO 16000-11.

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.

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

ISO 16000-9, *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*

EN 13725, *Air quality — Determination of odour concentration by dynamic olfactometry*

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

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

3.1.1
odour
pleasant or unpleasant smell caused by chemical compounds emitting to indoor air from a building product or material

3.1.2
acceptability
assessment of an odour emission to indoor air which can be ascertained according to a scale ranging from “clearly acceptable” to “clearly unacceptable” set by value on a defined evaluation scale

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3.1.3
perceived intensity
parameter to assess odour intensity based on a comparable scale

NOTE See 5492:2008, 2.8, 2.9 and 4.30.

3.1.4
hedonic tone
odour effect, which can be ascertained according to a scale ranging from “extremely pleasant” to “extremely unpleasant”

3.1.5
panel selection
procedure to determine which persons are qualified to serve as panel members

3.1.6
sensory fatigue
form of sensory adaptation in which a decrease in sensitivity occurs

3.1.7
sensory adaptation
temporary modification of the sensitivity of a sense organ due to continued and/or repeated stimulation, which is reversible

[ISO 5492:2008, definition 2.6]

3.1.8
anosmia
lack of sensitivity to some olfactory stimulus due to physiological defects, which is not reversible

NOTE Adapted from ISO 5492:2008, 2.32.

3.1.9
sensory odour panel
group of trained or untrained assessors performing the sensory assessment of the odour emission from building products or materials

NOTE See ISO 5492:2008, definition 1.9.

3.1.10
panel leader
person whose primary duties are to manage panel activities and recruit, train and monitor the assessors

3.1.11
panel member
person who is accepted to assess the odours

3.1.12
untrained panel
panel consisting of members who assess the odour emission without any training on odorous references

3.1.13
trained panel
panel consisting of members who are trained to judge the intensity of odour emission

3.1.14
air exchange rate
ratio of the volume of clean air brought into the test chamber hourly and the free test chamber volume measured in identical units

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3.1.15
outlet air flow rate
air volume per time at the chamber outlet

NOTE The outlet air flow rate is expressed as volume per second.

3.1.16
air velocity
air speed over the surface of the test specimen

3.1.17
area specific air flow rate
ratio between the supply air flow rate and the area of the test specimen

3.1.18
building product
building material or component produced for incorporation in a permanent manner in construction works

NOTE A building product can be solid, liquid or combined (see ISO 16000-11).

EXAMPLE 1 Examples of solid building products include flooring, wall covering, ceiling materials.

EXAMPLE 2 Examples of liquid building products include paints, varnishes, oils, waxes, levelling compounds, plasters, mortars, concrete, adhesives, sealants, caulks, putties and surface coatings.

EXAMPLE 3 Examples of combined building products include glued applications, such as floor and wall coverings, which are fixed on the building site on to surfaces using adhesives.

3.1.19
diffuser
funnel-shaped device for assessing the odour from the test chamber or from an odour sample container

3.1.20
mask
auxiliary odour-assessment device for cases where the exhaust air volumes required by the diffuser cannot be reached

3.1.21
test chamber
enclosure with controlled operational parameters for the determination of volatile organic compounds and odours emitted from test specimens prepared from building products

3.1.22
test room
room where the odour test takes place

3.1.23
clean air
odourless air

See 3.1.29.

3.1.24
product loading factor
ratio of exposed surface area of the test specimen and the free test chamber volume

3.1.25
sample container
device for containing or carrying used for transporting the odour sample from the test chamber to the test room and for introducing the sample to the panel members

EXAMPLE A container may be a carton, can, tube, bag or packaging.

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3.1.26
sample
part or piece of a building product as placed on the market

3.1.27
test specimen
part of the sample specially prepared for emission testing in a test chamber in order to simulate the odour emission behaviour of the material or product being tested

3.1.28
odour sample
air sample collected from the test chamber outlet in containers and being tested for its odour

NOTE An example of a container is a flexible bag.

3.1.29
odourlessness
odour assessed by the panel as being below the required value

3.2 Symbols and units

For the purposes of this document, the following symbols apply.

Symbol	Meaning	Unit
L	product loading factor	square metres per cubic metre
n	air exchange rate	changes per hour
$q_{V,A}$	area specific air flow rate (n/L)	cubic metres per square metre and hour
A	surface area	square metre
Π	perceived intensity	odour intensity unit pi
$q_{V,\mathrm{c}}$	volumetric supply air flow rate	cubic metres per hour

3.3 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

FEP tetrafluoroethylene hexafluoropropylene copolymer

PVF polyvinyl fluoride

PET polyethyleneterephthalate

PU perceptual unit

RH relative humidity

QA quality assurance

QAPP quality assurance project plan

QC quality control

VOC volatile organic compound

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4 Principle

The odour emission from building products is measured using a sensory odour panel. The odour determination may be carried out simultaneously with chemical emission measurements in accordance with ISO 16000-9. The odour characteristics addressed in this part of ISO 16000 are the acceptability and the perceived intensity. Depending on the measurement task, the acceptability, perceived intensity or both characteristics shall be determined.

Depending on the measurement task, the determination of hedonic tone may be used as a complementary method of these assessments.

5 Test facilities

5.1 General

A facility designed and operated to determine odours emitted from building products consists of a test chamber containing the test specimen. The test chamber is placed in an odourless well-ventilated testing room. The working environment for panel members containing the test chamber shall be pleasant and odourless. Any odour emissions from equipment, furnishings and materials (paints, wall and floor coverings and furniture, etc.) installed in the test room shall be avoided.

The test room in which the sensory assessment is performed shall comply with the general requirements described in 6.8.1.

The test chamber shall contain a clean air generation and humidification system, an air mixing system, and monitoring and control systems to ensure that the test is carried out to specified conditions in accordance with ISO 16000-9.

The chamber outlet shall be adapted to the direct assessment of the odour with a diffuser or mask or to the sampling of chamber air in containers.

If the odour assessment is carried out directly from the outlet of the chamber, the chamber material shall be non-transparent or the chamber shall be covered in order to avoid the panel members being influenced by visual recognition of the material in test.

General specifications and requirements, which apply to all types of test chambers, are included in this part of ISO 16000.

5.2 Apparatus

The equipment necessary for carrying out an odour emission test is the following.

5.2.1 Clean air supply, for example pressurized purified air or synthetic air in gas cylinders or odourless air from test room.

5.2.2 Test chamber system.

5.2.3 Humidification system.

5.2.4 Air humidity, temperature and air velocity monitoring systems.

5.2.5 Air flow meters.

5.2.6 Cleaning agent, for cleaning the test chamber walls and the diffuser or mask.

5.2.7 Equipment for measuring the mixture of air.

5.2.8 Equipment for odour sampling and assessment.

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