INTERNATIONAL STANDARD

ISO 16000-28

Second edition
2020-11

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 16000-28:2020(E)

© ISO 2020



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols and abbreviated terms **3**
5 Principle **3**
6 Test facilities **3**
6.1 General 3
6.2 Test room and recovery room 4
6.3 Odour sampling and assessment devices 4
6.3.1 General 4
6.3.2 Funnel 4
6.3.3 Sample containers 5
6.3.4 Sample presentation system 5
6.4 Comparative scale 5
6.4.1 General 5
6.4.2 Set up of the comparative scale 6
6.4.3 Check-up of the comparative scale 7
6.4.4 Measurement of acetone concentration and calibration of the measurement device 7
7 Test requirements **8**
7.1 General 8
7.2 Emission test chamber and test room background odour 8
7.2.1 Background odour 8
7.2.2 Test room conditions 8
7.2.3 Ventilation of the test room 8
7.2.4 Recovery room conditions 9
8 Odour testing from emission test chambers **9**
8.1 General 9
8.2 Emission test chamber preparation 9
8.3 Time of odour measurements 9
8.4 Conditioning of sample containers 9
8.5 Handling of sample containers 9
9 Sensory odour panel and panel leader **10**
9.1 Panel leader 10
9.1.1 General requirements for the panel leader 10
9.1.2 Additional requirements for the panel leader for perceived intensity assessments 10
9.2 Panel selection 11
9.2.1 General requirements for panel selection 11
9.2.2 Additional requirements for the panel selection for perceived intensity assessments 11
9.3 Code of conduct of the panel members 11
9.4 Correct procedure for determination of the panel size 12
9.5 Panel training 12
10 Sensory test methods and procedure **12**
10.1 General 12
10.2 Procedure 12
10.3 Determination of acceptability 13

© ISO 2020 – All rights reserved

10.4 Determination of the perceived intensity using a comparative scale 14
10.4.1 Comparative scale 14
10.4.2 Panel 14
10.4.3 Panel training 15
10.4.4 Procedure 15
10.5 Determination of the hedonic tone 16
11 Data analysis **17**
11.1 Calculation of mean value and standard deviation 17
11.2 Accurace of sensory testing 18
12 Test report **18**
Annex A (informative) **Training procedure for the comparative scale** **20**
Annex B (informative) **General conditions for sensory testing** **24**
Annex C (informative) **Sampling containers (bags) and sampling and presentation device** **29**
Annex D (informative) **Example for statistical data analysis** **32**
Bibliography **34**

 © ISO 2020 – All rights reserved

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 16000-28:2012), which has been technically revised. The main changes compared to the previous edition are as follows:

— besides acceptability and perceived intensity, the hedonic tone is described as odour characteristic;

— a more detailed description of the comparative scale, including information on set-up, check-up and calibration devices;

— recommendation on panel sizes for the different testing procedures (acceptability, perceived intensity and hedonic tone);

— procedure in case of failing the confidence interval.

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.

© ISO 2020 – All rights reserved

Introduction

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

The determination of odour acceptability, intensity and hedonic tone of emissions from building products and materials 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 and materials on the indoor air quality;

— to promote the development of improved products.

The method can also be used for furnishings and consumer products. For this purpose, a suitable exposure scenario (according to the reference room defined in EN 16516) needs to be defined.

© ISO 2020 – All rights reserved

Indoor air —

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

1 Scope

This document specifies a laboratory test method using test chambers defined in ISO 16000-9 and further specified in EN 16516 and evaluation procedures for the determination of odours emitted from building products and materials.

Sampling, transport and storage of materials under test, as well as preparation of test specimens are described in ISO 16000-11 and further specified in EN 16516.

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

EN 16516, *Construction products: Assessment of release of dangerous substances — Determination of emissions into indoor air*

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 http://www.electropedia.org/

3.1
acceptability
assessment of an odour emission into 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

3.2
anosmia
lack of sensitivity to some olfactory stimulus due to physiological defects, which is not reversible

3.3
building product
product for incorporation in a permanent manner in construction works

Note 1 to entry: A building product can be solid, liquid or combined (see ISO 16000-11).

© ISO 2020 – All rights reserved

3.4
hedonic tone
odour (3.5) quality, which can be ascertained on a scale ranging from “extremely pleasant” to "extremely unpleasant

3.5
odour
sensory attribute perceptible by the olfactory organ on sniffing certain volatile substances

3.6
odour sample
air sample collected from the test chamber outlet in containers and being tested for its *odour* (3.5)

3.7
background odours
odours (3.5) released by equipment or location that might disturb the test procedure

3.8
panel leader
person whose primary duties are to manage panel activities and recruit, train and monitor the assessors

3.9
panel member
person who is accepted to assess odours according to a defined method

Note 1 to entry: Depending on the method panel members may need to be trained.

3.10
perceived intensity
parameter to assess the strength of an odour based on a comparative scale

Note 1 to entry: See ISO 5492:2008, 2.8, 2.9 and 4.30.

3.11
recovery room
room where the panel members can recover and acclimatize before and between *odour* (3.5) assessments

3.12
sample container
device for collection and transport of the *odour* (3.5) sample from the test chamber to the test room and for presentation of the sample to the *panel members* (3.9)

3.13
sensory adaption
temporary modification of the sensitivity of a sense organ due to continued and/or repeated stimulation, which is reversible

[SOURCE: see ISO 5492:2008, 2.6]

3.14
sensory odour panel
group of trained or untrained *panel members* (3.9) performing the sensory assessment of the *odour* (3.5) emission from *building products* (3.3) or materials

[SOURCE: see ISO 5492:2008, 1.9]

3.15
test room
room where the *odour* (3.5) assessment takes place

© ISO 2020 – All rights reserved

3.16
test specimen
part of a sample specially prepared for emission testing in a test chamber in order to simulate the *odour* (3.5) emission behaviour of the material or product being tested

4 Symbols and abbreviated terms

For the purposes of this document, the following symbols apply (see ISO 16000-9).

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

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

PVF polyvinyl fluoride

PET polyethyleneterephthalate

rH relative humidity

VOC volatile organic compound

PAD photoacoustic detector

PID photo ionization detector

FID flame ionization detector

5 Principle

The odour emission from building products and materials is measured using a sensory odour panel. The odour determination may be performed in parallel to chemical emission measurements in accordance with ISO 16000-9 and further specified in EN 16516. The odour characteristics addressed in this part of ISO 16000 are the acceptability, the perceived intensity and the hedonic tone. Depending on the measurement task, these odour characteristics or a combination of those can be determined.

6 Test facilities

6.1 General

A facility designed and operated to determine odours emitted from building products and materials consists of an emission test chamber containing the test specimen. The emission 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 performed to indicated conditions in accordance with ISO 16000-9 and further specified in EN 16516.

© ISO 2020 – All rights reserved