
Interior air of road vehicles —

Part 7:

**Odour determination in interior air
of road vehicles and test chamber
air of trim components by olfactory
measurements**

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Air intérieur des véhicules routiers —

*Partie 7: Détermination des odeurs dans l'air intérieur des véhicules
routiers et dans les chambres d'essai d'air des composants de finition*

par des mesurages olfactifs

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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 on 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 the following URL: www.iso.org/iso/foreword.html.

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

A list of all the parts in the ISO 12219 series can be found on the ISO website.

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Introduction

Volatile and semi-volatile organic compounds (VOCs and SVOCs) are widely used in industry and may be emitted by many everyday products and materials. They have attracted attention in recent years because of their impact on indoor air quality. After homes and workplaces, people spend a lot of time in their vehicles. It is important to determine the material emissions of interior parts and to reduce them to an acceptable level, if required. Therefore, it is necessary to obtain comprehensive and reliable information about the types of organic compounds in the indoor air of vehicles and their concentrations as well as an odour impression.

Since olfactory assessment is based on very subjective impressions, it is necessary to make this subjectivity comparable by means of a standardized procedure. This document describes a controlled olfactory examination of the interior air of road vehicles and the chamber air of trim components.

This document adopts the general requirements already specified in the International Standards of the ISO 16000 series which deal with the determination of odour emissions from building products using test chambers (see ISO 16000-28) and with sensory testing of indoor air (see ISO 16000-30), but uses different odour evaluation schemes developed for the automotive industry.

A risk assessment should be carried out to clarify that no harmful compounds are present in the room. In some countries, an ethics committee may require this.

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Interior air of road vehicles —

Part 7:

Odour determination in interior air of road vehicles and test chamber air of trim components by olfactory measurements

1 Scope

This document specifies a standardized and objective process to analyse and determine the olfactory behaviour of components, semi-finished products and materials fitted in the interior of road vehicles. The odour determination is either performed by using samples from the interior air of road vehicles or from emission test chamber air. This document describes an olfactory screening method based on different scales for the olfactory assessment which are described in the annexes. Other olfactory assessments, e.g. according to ISO 16000-28, are also possible but are not the focus of this document.

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 8589, *Sensory analysis — General guidance for the design of test rooms*

ISO 12219-1, *Interior air of road vehicles — Part 1: Whole vehicle test chamber — Specification and method for the determination of volatile organic compounds in cabin interiors*

ISO 12219-4:2013, *Interior air of road vehicles — Part 4: Method for the determination of the emissions of volatile organic compounds from vehicle interior parts and materials — Small chamber method*

ISO 16000-28:2012, *Indoor air — Part 28: Determination of odour emissions from building products using test chambers*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12219-1, ISO 12219-4, ISO 16000-28 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

**3.1.1
odour**

pleasant or unpleasant smell caused by chemical compounds emitting to indoor air from a building product or material, automotive part or whole vehicle interior

[SOURCE: ISO 16000-28:2012, 3.1.1, modified — The phrase “automotive part or whole vehicle interior” has been added.]

**3.1.2
sensory odour panel**

group of trained or untrained assessors performing the sensory assessment of the odour emission from building products or materials, automotive parts or whole vehicle interior

[SOURCE: ISO 16000-28:2012, 3.1.9, modified — The phrase “automotive parts or whole vehicle interior” has been added.]

**3.1.3
panel member**

<odour determination>person who is accepted to assess the *odours* (3.1.1)

[SOURCE: ISO 16000-28:2012, 3.1.11]

**3.1.4
panel leader**

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

[SOURCE: ISO 16000-28:2012, 3.1.10]

**3.1.5
panel selection**

procedure to determine which persons are qualified to serve as *panel members* (3.1.3)

[SOURCE: ISO 16000-28:2012, 3.1.5]

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**3.1.6
sensory adaptation**

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

[SOURCE: ISO 5492:2008, 2.6, modified — The phrase “which is reversible” has been added.]

**3.1.7
sensory fatigue**

form of *sensory adaptation* (3.1.6) in which a decrease in sensitivity occurs

[SOURCE: ISO 16000-28:2012, 3.1.6]

**3.1.8
anosmia**

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

[SOURCE: ISO 5492:2008, 2.32, modified]

**3.1.9
clean air**
odourless air

[SOURCE: ISO 16000-28:2012, 3.1.23]

3.1.10**odourlessness**

odour (3.1.1) assessed by the panel as being below the required value

[SOURCE: ISO 16000-28:2012, 3.1.29]

3.1.11**background concentration**

concentration of a specific *volatile organic compound* (3.1.24) (or group of volatile organic compounds) measured in the small chamber outlet or the whole vehicle test chamber

[SOURCE: ISO 12219-4:2013, 3.6, modified — The phrase “or the whole vehicle test chamber” has been added.]

3.1.12**sampled air**

air collected for subsequent measurement

3.1.13**air exchange rate**

ratio of the volume of *clean air* (3.1.9) brought into the *test chamber* (3.1.20) hourly and the free test chamber volume measured in identical units

[SOURCE: ISO 16000-28:2012, 3.1.14]

3.1.14**outlet air flow rate**

air volume per time at the chamber outlet

Note 1 to entry: The outlet air flow rate is expressed as volume per second.

[SOURCE: ISO 16000-28:2012, 3.1.15], [ISO 12219-7:2017](https://standards.iteh.ai/catalog/standards/sist/21cf2af5-4570-4caa-953f-5e1db6801007/iso-12219-7-2017)
<https://standards.iteh.ai/catalog/standards/sist/21cf2af5-4570-4caa-953f-5e1db6801007/iso-12219-7-2017>

3.1.15**air velocity**

air speed over the surface of the *test specimen* (3.1.23)

[SOURCE: ISO 16000-28:2012, 3.1.16]

3.1.16**supply air**

sum of all gaseous volume flows conducted into the small chamber

[SOURCE: ISO 12219-4:2013, 3.12, modified — Note 1 to entry has been deleted.]

3.1.17**area specific air flow rate**

ratio between the supply air flow rate and the area of the *test specimen* (3.1.23)

[SOURCE: ISO 16000-28:2012, 3.1.17]

3.1.18**air mixing**

thorough intermingling of the air volume to be investigated

3.1.19**trim component**

component produced for incorporation in a vehicle cabin

3.1.20

test chamber

enclosure with controlled operational parameters for the determination of *volatile organic compounds* (3.1.24) and *odours* (3.1.1) emitted from *test specimens* (3.1.23) prepared from building products, automotive parts or whole vehicle interior

[SOURCE: ISO 16000-28:2012, 3.1.21, modified — The phrase “automotive parts or whole vehicle interior” has been added.]

3.1.21

test room

room where the *odour* (3.1.1) test takes place

[SOURCE: ISO 16000-28:2012, 3.1.22]

3.1.22

product loading factor

ratio of exposed surface area of the *test specimen* (3.1.23) and the free test chamber volume

[SOURCE: ISO 16000-28:2012, 3.1.24]

3.1.23

test specimen

part of the sample specially prepared for emission testing in a *test chamber* (3.1.20) in order to simulate the odour emission behaviour of the material or product being tested

[SOURCE: ISO 16000-28:2012, 3.1.27]

3.1.24

odour sample

air sample collected from the test chamber outlet in containers and being tested for its *odour* (3.1.1)

Note 1 to entry: An example of a container is a flexible bag.

[SOURCE: ISO 16000-28:2012, 3.1.28]

3.1.25

volatile organic compound

VOC

organic compound that is emitted from the vehicle interior trim or from the *test specimen* (3.1.23) and all those detected in the interior air of road vehicles or in the chamber air of *trim components* (3.1.19)

[SOURCE: ISO 16000-9:2006, 3.15, modified]

3.1.26

olfactory reference material

homogeneous, stable and well-defined preparation of a chemical odorous compound (with unique CAS number) used for the training and calibration of the *panel members* (3.1.3)

Note 1 to entry: For example, different concentrations of butanol or acetone can be used to train the panel members or to assess odour intensity.

3.2 Abbreviated terms

FEP tetrafluoroethylene hexafluoropropylene copolymer

PVF polyvinyl fluoride

PET	polyethyleneterephthalate
RH	relative humidity
VOC	volatile organic compound

4 Principle

The odour emission from road vehicle interior trim and trim components is measured using a sensory odour panel. The odour sampling from material parts or entire car cabin may be realized according to the sampling bag method described in this document. The odour determination may be carried out simultaneously with chemical emission measurements in accordance with ISO 12219-1 and ISO 12219-4. This document describes an olfactory screening method based on different scales for the olfactory assessment which are described in the annexes. These scales for olfactory analyses specified in this document deliberately differ from the scales specified in ISO 16000-28 to meet the specific needs of the automotive industry. In addition, the description of the odour character by olfactory notes using a set of chemical descriptors is informatively specified in [Annex D](#).

5 Test facilities

5.1 General

Samples are either taken from the interior air of the road vehicles or from an emission test chamber atmosphere. The sample assessment is performed in a separate test room. The working environment of the test room for sensory odour panel members containing the odour test equipment shall be odourless and maintained under the conditions specified in ISO 8589. Any odour emissions from equipment, furnishings and materials (paints, wall and floor coverings and furniture, etc.) installed in the test room shall be avoided.

A facility designed and operated to determine the odour in the interior air of road vehicles consists of a whole vehicle test chamber meeting the requirements specified in ISO 12219-1. The whole vehicle test chamber is big enough to house the test vehicle completely and shall contain a clean air generation system. A solar radiator system is installed to heat the test vehicle cabin with a fixed irradiation. The resulting temperature inside the cabin depends on the insulation and the window glass material (the minimum requirements are specified in ISO 12219-1).

A facility designed and operated to determine odours emitted from trim components consists of an emission test chamber containing the test specimen. The emission test chamber shall meet the requirements specified in ISO 12219-4. It 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. The emission test chamber outlet shall be adapted to the sampling of chamber air in containers.

5.2 Odour test equipment

The following equipment is also necessary for the odour determination in interior air of road vehicles and in emission test chamber air of trim components by olfactory measurements.

5.2.1 Air sampling bag

The air sampling bag shall not induce any alteration of the odour being sampled. The bag with a volume of typically 5 l to 10 l shall, therefore, be airtight, odourless, non-permeable and non-adsorptive. So far, the following materials are considered appropriate for making air sampling bags:

- tetrafluoroethylene hexafluoropropylene copolymer (FEP);
- polyvinyl fluoride (PVF);