



# SLOVENSKI STANDARD

## SIST ISO 12219-4:2014

01-julij-2014

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**Notranji zrak v cestnih vozilih - 4. del: Metoda za določevanje emisij hlapnih organskih spojin iz notranjih delov in materialov - Metoda z majhno komoro**

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

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Air intérieur des véhicules routiers - Partie 4: Méthode pour la détermination des émissions de composés organiques volatils des parties et des matériaux intérieurs des véhicules - Méthode de la petite chambre

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**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***Air intérieure des véhicules routiers —*

*Partie 4: Méthode pour la détermination des émissions de composés  
organiques volatils des parties et des matériaux intérieurs des  
véhicules — Méthode de la petite chambre*

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Tel. + 41 22 749 01 11  
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# Contents

	Page
Foreword.....	iv
Introduction.....	v
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>2</b>
<b>4 Symbols.....</b>	<b>4</b>
<b>5 Principle.....</b>	<b>5</b>
<b>6 Emission test bed preparation.....</b>	<b>5</b>
6.1 Components.....	5
6.2 Small chamber.....	5
6.3 Small chamber temperature control.....	6
6.4 Air humidification.....	6
6.5 Clean air supply.....	7
<b>7 Quality control.....</b>	<b>7</b>
7.1 General.....	7
7.2 Airtightness.....	7
7.3 Recovery and sink effects.....	8
7.4 Supply air.....	9
<b>8 Component or automotive interior product.....</b>	<b>10</b>
8.1 General.....	10
8.2 History of the component or automotive interior product.....	10
8.3 Packaging, transport and storage of the component or automotive interior product.....	10
<b>9 Standard emission test procedure.....</b>	<b>10</b>
9.1 General.....	10
9.2 Cleaning and purification.....	11
9.3 Test.....	11
<b>10 Calculation of emission rate.....</b>	<b>13</b>
<b>11 Test report.....</b>	<b>13</b>
<b>12 Quality assurance/quality control (QA/QC).....</b>	<b>14</b>
<b>Bibliography.....</b>	<b>16</b>

## ISO 12219-4:2013(E)

## 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 12219-4 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 6, *Indoor air*, in collaboration with Technical Committee ISO/TC 22, *Road vehicles*.

ISO 12219 consists of the following parts, under the general title *Interior air of road vehicles*:

- *Part 1: Whole vehicle test chamber — Specification and method for the determination of volatile organic compounds in cabin interiors*
- *Part 2: Screening method for the determination of the emissions of volatile organic compounds from vehicle interior parts and materials — Bag method*
- *Part 3: Screening method for the determination of the emissions of volatile organic compounds from vehicle interior parts and materials — Micro-scale chamber method*
- *Part 4: Method for the determination of the emissions of volatile organic compounds from vehicle interior parts and materials — Small chamber method*
- *Part 5: Screening method for the determination of the emissions of volatile organic compounds from vehicle interior parts and materials — Static chamber method*

The following parts are under preparation:

- *Part 6: Method for the determination of the emissions of semi-volatile organic compounds from vehicle interior parts and materials — Small chamber method*
- *Part 7: Odour determination in interior air of road vehicles and test chamber air of trim components by olfactory measurements*

## Introduction

Volatile organic compounds (VOCs) are widely used in industry and can 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 interior air of vehicles and also their concentrations.

Monitoring emissions from vehicle trim components can be performed in several ways and the approach selected depends upon the desired outcome and the material type. For example, to obtain emissions data from complete assemblies (e.g. a dashboard or seat) it is necessary to employ emissions chambers or bags that have sufficient volume to house the complete assembly (typically  $\geq 4 \text{ m}^3$ ). Such tests may take several hours or even days to perform, depending on specified equilibration times and the requirements of the relevant test protocol.

This part of ISO 12219 outlines a method of measuring the types and levels of VOCs in vehicle trim components under controlled conditions using a small emission test chamber (small chamber). It describes requirements for a small chamber and a test protocol. Measurements are carried out according to ISO 16000-6 (VOCs) and ISO 16000-3 (carbonyl compounds).

The capacity of a small chamber is not limited to small assemblies or representative samples of homogeneous car trim materials. Small chambers allow qualitative and quantitative VOC emission data to be measured and recorded. The subsequent VOC emission data can be used to develop a correlation between material level methods and the vehicle level method.

This part of ISO 12219 is based on VDA 276<sup>[2]</sup> and ASTM D5116<sup>[1]</sup> and correlates to ISO 16000-9.<sup>[4]</sup>

ISO 16000-3, ISO 16000-5,<sup>[3]</sup> ISO 16000-6, ISO 16000-9,<sup>[4]</sup> ISO 16000-10,<sup>[5]</sup> ISO 16000-11,<sup>[6]</sup> ISO 16000-24,<sup>[7]</sup> ISO 16000-25,<sup>[8]</sup> as well as ISO 16017-1<sup>[9]</sup> and ISO 16017-2<sup>[10]</sup> also focus on VOC measurements.

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# 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

**WARNING — It is the responsibility of the user of this part of ISO 12219 to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use. National regulations for precautions shall be followed.**

## 1 Scope

This part of ISO 12219 specifies a qualitative and quantitative analytical method for vapour-phase organic compounds (volatile and some semi-volatile) released from car trim materials under simulated real use conditions using small emission test chambers (small chamber). Small chambers are intended to provide a transfer function to vehicle level emissions. This method is intended for evaluating new car interior trim components but can, in principle, be applied to used car components.

Target compounds include VOCs (conventionally defined as organic compounds in the volatility range *n*-hexane to *n*-hexadecane) and volatile carbonyl compounds such as formaldehyde. The specified analytical procedure for VOCs is ISO 16000-6 and for formaldehyde and some other light carbonyl compounds is ISO 16000-3.

NOTE Compounds more volatile than *n*-hexane and less volatile than *n*-hexadecane can also be analysed (see ISO 16000-6:2011, Annex D, and ISO 16017-1 [8] for more information).

This part of ISO 12219 is complementary to ASTM D5116 [1] and VDA 276, [2] and provides third party test laboratories and manufacturing industry with an approach for:

- a) identifying the effect of real use conditions on specific VOC emissions data;
- b) comparing emissions from various assemblies with regards to specific VOC emissions;
- c) evaluating and sorting specific assemblies regarding specific VOC emissions data;
- d) providing specific VOC emissions data to develop and verify a correlation between material level methods and the vehicle level method;
- e) evaluating prototype, “low-emission” assemblies during development.

## 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 3833, *Road vehicles — Types — Terms and definitions*

ISO 16000-3:2011, *Indoor air — Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air — Active sampling method*

ISO 16000-6:2011, *Indoor air — 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*

## ISO 12219-4:2013(E)

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3833 and the following apply.

**3.1**  
**air change rate**  
volume ratio of clean air brought into the small chamber per hour and the free small chamber volume measured in identical units

[SOURCE: ISO 16000-9:2006, <sup>4</sup> definition 3.1, modified]

**3.2**  
**air circulation**  
ideal mixing of the small chamber

**3.3**  
**air flow rate**  
air volume entering into the small chamber per time

[SOURCE: ISO 16000-9:2006, <sup>4</sup> definition 3.2, modified]

**3.4**  
**air sample**  
representative quantitatively preset volume of the atmosphere in the small chamber

**3.5**  
**air speed**  
medium air speed over the surface of the test specimen

**3.6**  
**background concentration**  
concentration of a specific volatile organic compound, VOC<sub>x</sub>, (or group of volatile organic compounds) measured in the small chamber outlet

**3.7**  
**clean air supply**  
pressurized purified air or synthetic air in gas cylinders

**3.8**  
**small chamber**  
enclosure with controlled operational parameters for the destination of volatile organic compounds emitted from products

**3.9**  
**small chamber concentration**  
concentration of a specific volatile organic compound, VOC<sub>x</sub>, (or group of volatile organic compounds) measured in the small chamber outlet

**3.10**  
**emission**  
organic substances that escape from the component under the existing test conditions

**3.11**  
**ideal air mixing**  
substance diffusing in an ideally mixed chamber, without time delay, completely and homogeneously throughout the whole chamber

**3.12**  
**supply air**  
sum of all gaseous volume flows conducted into the small chamber

Note 1 to entry: The supply air is expressed as a volume flow per time.

**3.13****product loading factor**

ratio of exposed surface area (or mass or volume) of the test specimen and the free small chamber volume

**3.14****recovery rate**

measured mass of a target volatile organic compound in the air leaving the small chamber during a given time period divided by the mass of target volatile organic compound added to the small chamber in the same time period

Note 1 to entry: The recovery provides information about the performance of the entire method.

Note 2 to entry: The recovery rate is expressed in per cent.

**3.15****sample**

part of piece of a product that is representative of the production

[SOURCE: ISO 16000-9:2006, <sup>4</sup> definition 3.10]

**3.16****specific emission rate**

$q_x$

product-specific rate describing the mass of a volatile organic compound emitted from a product per time at a given time from the start of the test

Note 1 to entry: Area-specific emission rate,  $q_A$ , is used in this part of ISO 12219. Several other specific emission rates can be defined according to different requirements, e.g. length-specific emission rate,  $q_l$ , volume-specific emission rate,  $q_V$ , and unit-specific emission rate,  $q_u$ .

Note 2 to entry: The term “area-specific emission rate” is sometimes used in parallel with the term “emission factor”.

[SOURCE: ISO 16000-9:2006, <sup>4</sup> definition 3.11, modified]

Note 3 to entry: The specific emission rate is expressed in units of mass per time.

**3.17****surface of the component****surface of the automotive interior product**

surface that is formed by the outline of the component or automotive interior product and penetrable by organic substances

**3.18****target volatile organic compound**

product-specific volatile organic compound

**3.19****test specimen**

part of the sample specifically prepared for emission testing in the small chamber in order to simulate the emission behaviour of the material or product that is tested

[SOURCE: ISO 16000-9:2006, <sup>4</sup> definition 3.13, modified]