

# SLOVENSKI STANDARD

## SIST ENV 13419-1:2000

01-november-2000

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Building products - Determination of the emission of volatile organic compounds - Part 1:  
Emission test chamber method

Bauprodukte - Bestimmung der Emission von flüchtigen organischen Verbindungen - Teil  
1: Emissionsprüfkammer-Verfahren

Produits de construction - Détermination des émissions de composés organiques volatils  
- Partie 1: Méthode de la chambre d'essai d'émission

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### ICS:

13.040.99	Drugi standardi v zvezi s kakovostjo zraka	Other standards related to air quality
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EUROPEAN PRESTANDARD  
PRÉNORME EUROPÉENNE  
EUROPÄISCHE VORNORM

ENV 13419-1

August 1999

ICS 13.040.99

English version

Building products - Determination of the emission of volatile  
organic compounds - Part 1: Emission test chamber method

Produits de construction - Détermination des émissions de  
composés organiques volatils - Partie 1: Méthode de la  
chambre d'essai d'émission

Bauprodukte - Bestimmung der Emission von flüchtigen  
organischen Verbindungen - Teil 1: Emissionsprüfkammer-  
Verfahren

This European Prestandard (ENV) was approved by CEN on 6 May 1999 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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<b>Contents</b>	<b>Page</b>
<b>Foreword .....</b>	<b>3</b>
<b>Introduction.....</b>	<b>4</b>
<b>1 Scope .....</b>	<b>5</b>
<b>2 Normative references .....</b>	<b>5</b>
<b>3 Definitions, abbreviations, symbols and units .....</b>	<b>5</b>
<b>4 Principle.....</b>	<b>7</b>
<b>5 Apparatus .....</b>	<b>7</b>
<b>6 Test conditions .....</b>	<b>9</b>
<b>7 Verification of the test conditions.....</b>	<b>9</b>
<b>8 Test specimens.....</b>	<b>11</b>
<b>9 Emission test chamber preparation.....</b>	<b>11</b>
<b>10 Test method .....</b>	<b>11</b>
<b>11 Calculation of area specific emission rates and expression of results .....</b>	<b>12</b>
<b>12 Test report.....</b>	<b>13</b>
<b>Annex A (normative) System for quality assurance / quality control .....</b>	<b>14</b>
<b>Annex B (informative) Examples of area specific air flow rates in a model room.....</b>	<b>15</b>
<b>Annex C (informative) General description of an emission test chamber.....</b>	<b>16</b>
<b>Annex D (informative) Bibliography .....</b>	<b>17</b>

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<https://standards.iteh.ai/catalog/standards/sist/f0e71b71-29ee-4060-b4d9-aec9f43f4d3f/sist-env-13419-1-2000>

## Foreword

This European Prestandard has been prepared by Technical Committee CEN/TC 264 "Air quality", the secretariat of which is held by DIN.

This prestandard consists of four parts:

- Part 1: Emission test chamber method;
- Part 2: Emission test cell method;
- Part 3: Procedure for sampling, storage of samples and preparation of test specimens;
- Part 4: Determination of VOCs; active sampling on Tenax TA, thermal desorption and gas chromatographic method.

Part 4 is under preparation within ISO/TC 146. It is intended that after the final voting stage, the CEN prestandard (Parts 1-3) will be taken over by ISO and the ISO standard (Part 4) will be taken over by CEN.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

The determination of volatile organic compounds (VOCs) emitted from building products using emission test chambers has objectives such as:

- to provide manufacturers, builders, and end users with emission data useful for the evaluation of the impact of building products on the indoor air quality;
- to promote the development of improved products.

The method can in principle be used for most solid and liquid (on solid substrate) building products used indoors.

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## 1 Scope

This prestandard specifies a general laboratory test method for determination of the area specific emission rate of volatile organic compounds (VOCs) from newly produced building products under defined climate conditions. The method can also, in principle, be applied to aged products. The emission data obtained can be used to calculate concentrations in a model room.

This part of the prestandard applies to various emission test chambers used for determination of the emission of volatile organic compounds from building products.

Sampling, transport and storage of materials to be tested, and preparation of test specimens are described in ENV 13419-3. Air sampling and analytical methods for the determination of VOCs are described in part 4 of this prestandard.

A general description of an emission test chamber is given in annex C of this part of the prestandard.

This prestandard is not applicable for the determination of formaldehyde emissions from wood-based panels, for this purpose refer to ENV 717 „Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method“.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revisions. For undated references the latest edition of the publication referred to applies.

- ISO 554, Standard atmospheres for conditioning and / or testing - Specifications;
- ISO 1765, Machine-made textile floor coverings - Determination of thickness;
- ISO 8543, Textile floor coverings - Methods for determination of mass;
- EN 428, Resilient floor coverings - Determination of overall thickness;
- EN 430, Resilient floor coverings - Determination of mass per unit area;
- EN 13419-3, Building products - Determination of the emission of volatile organic compounds - Part 3: Procedure for sampling, storage of samples and preparation of test specimens;
- ENV 717-1, Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method“.

## 3 Definitions, abbreviations, symbols and units

### 3.1 Symbols and units

$C_x$	is the concentration of a VOC <sub>x</sub> in the emission test chamber, in micrograms per cubic metre;
$L$	is the product loading factor, in square metres per cubic metre;
$n$	is the air exchange rate, in changes per hour;
$q$	is the area specific air flow rate ( $= n/L$ ), in cubic metres per square metre and hour;
$SER_a$	is the area specific emission rate, in micrograms per square metre and hour;
$SER_l$	is the length specific emission rate, in micrograms per meter and hour;
$SER_v$	is the volume specific emission rate, in micrograms per cubic metre and hour;
$SER_u$	is the unit specific emission rate, in micrograms per unit and hour;
$t$	is the time after start of the test, in hours or days.

### 3.2 Definitions and abbreviations

For the purposes of this prestandard, the following definitions apply:

**3.2.1 air exchange rate:** The ratio of the volume of clean air brought into the emission test chamber hourly and the free emission test chamber volume measured in identical units, expressed in air changes per hour.

**3.2.2 air flow rate:** Air volume entering into the emission test chamber per unit time.

**3.2.3 air velocity:** Air speed over the surface of the test specimen.

**3.2.4 area specific air flow rate:** Ratio between the supply air flow rate and the area of the test specimen.

**3.2.5 building product:** Product produced for incorporation in a permanent manner in construction works.

**3.2.6 emission test chamber:** Enclosure with controlled operational parameters for the determination of volatile organic compounds emitted from building products.

**3.2.7 emission test chamber concentration:** Concentration of a specific volatile organic compound,  $VOC_x$  (or group of volatile organic compounds) measured in the emission test chamber outlet.

**3.2.8 product loading factor:** Ratio of exposed surface area of the test specimen and the free emission test chamber volume.

**3.2.9 recovery:** Percent of measured mass of a target volatile organic compound in the air leaving the emission test chamber during a given time period divided by the mass of target volatile organic compound added to the emission test chamber in the same time period.

**NOTE** The recovery provides information about the performance of the entire method.

**3.2.10 sample:** A part or a piece of a building product which is representative of the production.

**3.2.11 specific emission rate (SER):** Product specific rate describing the mass of a volatile organic compound emitted from a product per unit time at a given time from the start of the test.

**NOTE 1** Area specific emission rate,  $SER_a$ , is used in this prestandard. Several other specific emission rates can be defined according to different requirements, e.g. length specific emission rate,  $SER_l$ , volume specific emission rate,  $SER_v$ , and unit specific emission rate,  $SER_u$ .

**NOTE 2** The term area specific emission rate is sometimes used in parallel with the term emission factor.

**3.2.12 target volatile organic compounds:** Product specific volatile organic compounds.

**3.2.13 test specimen:** Part of the sample specially prepared for emission testing in an emission test chamber in order to simulate the emission behaviour of the material or product which is tested.

**3.2.14 total volatile organic compounds (TVOC):** The sum of the concentrations of identified and unidentified volatile organic compounds between and including n-hexane and n-hexadecane; the areas of the unidentified peaks are converted to concentrations using the toluene response factor.

**3.2.15 volatile organic compounds (VOC):** In this prestandard, volatile organic compounds are defined as the organic compounds that are emitted from the test specimen and all those detected in the chamber outlet air. The emission test method described in this prestandard is optimum for the range of compounds specified by the definition of total volatile organic compounds (TVOC).



## 4 Principle

The principle of the test is to determine the area specific emission rate of VOCs emitted from building products. The test is performed in an emission test chamber at constant temperature, relative humidity, and area specific air flow rate. The air in the emission test chamber is fully mixed, and measurements of the VOC concentration in the air at the outlet are representative of the air in the emission test chamber. Area specific emission rates at a given time,  $t$ , are calculated from the emission test chamber air concentrations and the area specific air flow rate,  $q$ , (see clause 11).

With knowledge of the concentration in the air, the air flow through the emission test chamber and the surface area of the test specimen, the area specific emission rates of VOCs from the product under test can be determined.

## 5 Apparatus

A facility designed and operated to determine area specific emission rates for VOCs emitted from building products shall contain the following: emission test chamber, clean air generation and humidification system, air mixing system, monitoring and control systems to ensure that the test is carried out according to specified conditions.

General specifications and requirements which apply to all types of emission test chambers included in this part of the prestandard are given in 5.1 to 7.6 below.

The types of quality assurance / quality control activities carried out are described in annex A.

A general description of an emission test chamber is given in Annex C.

### 5.1 Emission test chamber materials

The emission test chamber and the parts of the sampling system coming in contact with the emitted VOCs shall be made of surface treated (polished) stainless steel or glass.

Other materials may be used for mixing devices, e.g. fans, and for sealing materials. These shall be low emitting and low adsorbing and shall not contribute to the emission test chamber background concentration.

### 5.2 Air supply and mixing facilities

The emission test chamber shall have facilities (e.g. electronic mass flow controller) capable of continuously controlling the air exchange rate at a fixed value with an accuracy of  $\pm 3\%$ .

The emission test chamber shall be designed to ensure proper mixing of the emission test chamber air. The requirements are given in 7.6.

**NOTE** Fans, multi-port inlet and outlet diffusers, perforated floors and baffle plates are used to obtain adequate mixing.

### 5.3 Air tightness

The emission test chamber shall be airtight in order to avoid uncontrolled air exchange with external air.

The emission test chamber shall be operated slightly above atmospheric pressure to avoid any influence from the laboratory atmosphere.