SLOVENSKI STANDARD
SIST EN 16402:2014

01-februar-2014

Barve in laki - Ocenjevanje emisij snovi iz premazov v notranji zrak - Vzorčenje, priprava vzorcev in preskušanje

Paints and varnishes - Assessment of emissions of substances from coatings into indoor air - Sampling, conditioning and testing

Beschichtungsstoffe - Bestimmung der Emissionen regulierter gefährlicher Stoffe von Beschichtungen in die Innenraumluft - Probenahme, Probenvorbereitung und Prüfung

Peintures et vernis - Évaluation des émissions de substances émanant des revêtements dans l'air intérieur - Échantillonnage, conditionnement et essais

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13.040.20	Kakovost okoljskega zraka	Ambient atmospheres
87.040	Barve in laki	Paints and varnishes

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EUROPEAN STANDARD

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English Version

Paints and varnishes - Assessment of emissions of substances from coatings into indoor air - Sampling, conditioning and testing

Peintures et vernis - Évaluation des émissions de substances émanant des revêtements dans l'air intérieur - Échantillonnage, conditionnement et essais

Beschichtungsstoffe - Bestimmung der Emissionen regulierter gefährlicher Stoffe von Beschichtungen in die Innenraumluft - Probenahme, Probenvorbereitung und Prüfung

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Foreword

This document (EN 16402:2013) has been prepared by Technical Committee CEN/TC 139 “Paints and varnishes”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2014, and conflicting national standards shall be withdrawn at the latest by April 2014.

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Introduction

This European Standard refers to the horizontal method (see CEN/TS 16516) for emission testing of construction products (developed in according to the Mandate M/366) and specifies the product specific details for architectural coatings and the product categories described in Clause 5.

The Construction Products Regulation (CPR) covers only coatings that are of influence to the construction and does not include architectural coatings.

Both CPR covered coatings and architectural coatings not covered by CPR may be tested according to this European Standard.

The determination of emission into indoor air is to be made under the conditions of use during the service life. The determination of emissions specified in this European Standard is associated with an emission scenario which specifies the climate and ventilation conditions of the air surrounding the product in a reference room. It is not applicable for the determination of emissions during the application.

A reference room is needed since it is not possible to evaluate emissions by testing in all possible use situations. The reference room dimensions and the resulting loading factors, the climate and ventilation conditions are the reference representing the general indoor air conditions. Based on the huge amount of available European experience, it was possible to identify one emission scenario and one reference room including a set of loading factors to be used.

This method is using a test chamber in which emissions are generated under conditions maintained constant during the test. These conditions are selected so that the results could be expressed either as emission rates or converted to concentrations in the reference room by calculations within the ranges where such calculations are valid.

This European Standard also addresses separately (see Clause 14 and informative Annex A) the simplified test methods, indirect test methods, secondary/alternative test methods that provide within their specific field of application a result comparable or correlated to the result of the reference method. Such methods can be easier to apply and/or cheaper. They can be used especially for Factory Production Control testing (FPC).

The aim of this European Standard is not to develop a new testing method but to combine by normative references the use of existing standards complemented, when necessary, with additional and/or modified requirements so that architectural coatings can be evaluated under comparable conditions with regard to emission into indoor air.

In particular, the horizontal test methods for emission testing of construction products (see CEN/TS 16516) as developed regarding to Mandate M/366 have been considered and will be taken into account for further revisions of this European Standard to ensure that comparable methods are applied for construction products as defined in Mandate M/366 and coatings covered by this European Standard.

1 Scope

This European Standard specifies a reference method for the determination of emissions from coatings into indoor air. This method is applicable to volatile organic compounds, semi-volatile organic compounds and volatile aldehydes.

NOTE This European Standard is aimed at describing the overall procedure and makes use of existing standards mainly by normative reference complemented when necessary with additional or modified normative requirements.

This European Standard applies to coatings for indoor use as listed in Clause 5.It is not applicable to coatings that are applied off site or coatings that are applied on site, prior to the structure being permanently weatherproof. It is not applicable for tinting pastes that are not ready for use as coating.

It is mainly aimed at determining emission data in indoor air for the purpose of voluntary labelling of products but may also be used for CE marking and associated Attestation of Conformity in the case of products that are covered by the Construction Products Regulation.

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.

EN 1232, *Workplace atmospheres - Pumps for personal sampling of chemical agents - Requirements and test methods*

EN 13300, *Paints and varnishes - Water-borne coating materials and coating systems for interior walls and ceilings - Classification*

EN 15824, *Specifications for external renders and internal plasters based on organic binders*

EN ISO 16000-9:2006, *Indoor air - Part 9: Determination of the emission of volatile organic compounds from building products and furnishing - Emission test chamber method (ISO 16000-9:2006)*

EN ISO 16000-11:2006, *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 (ISO 16000-11:2006)*

EN ISO 16017-1, *Indoor, ambient and workplace air - Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography - Part 1: Pumped sampling (ISO 16017-1)*

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

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*

3 Terms and definitions

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

3.1 Terms relating to sampling and product

3.1.1
sampling plan
predetermined procedure for the selection, withdrawal, preservation and transportation of product samples

Note 1 to entry: For the description of sampling plan, see CEN/TR 16220.

3.1.2
sample
portion of material selected from a larger quantity of material

[SOURCE: IUPAC:1997, 2.1.1]

Note 1 to entry: It is helpful to describe the manner of selection of the sample in a sampling plan.

Note 2 to entry: The term “sample” is often accompanied by a prefix (e.g. laboratory sample, test sample, test specimen) specifying the type of sample and/or the specific step in the sampling process to which the obtained material relates.

3.1.3
laboratory sample
sample or sub-sample(s) sent to or received by the laboratory

[SOURCE: IUPAC:1997, 2.5.5]

Note 1 to entry: When the laboratory sample is further prepared by mixing, drying, grinding or by combinations of these operations, the result is the test sample. When no preparation of the laboratory sample is required, the laboratory sample is the test sample. A test portion is removed from the test sample for the performance of the test/analysis or for the preparation of a test specimen.

Note 2 to entry: The laboratory sample is the final sample from the point of view of sample collection but it is the initial sample from the point of view of the laboratory.

3.1.4
curing
hardening of freshly prepared mixtures under well-defined conditions (time, temperature, humidity, etc)

3.1.5
curing time
minimum time necessary for curing before an emission test will produce meaningful test results

3.2 Terms relating to emissions into indoor air and associated laboratory testing

3.2.1
emission
liberation of chemical substances from a product into air

Note 1 to entry: Emission may be expressed as an emitted quantity in terms of concentrations in a defined volume of air or in terms of emission rate per hour and per unit quantity of the product (i.e. per area, length, mass, volume, unit or component).

Note 2 to entry: The terms “emission” and “release” have fundamentally the same meaning. However, by tradition, the term “emission” is used when describing liberation of chemical substances or radiation into air and the term “release” is used when describing the liberation of chemical substances into soil or water.

3.2.2
emission test chamber
enclosure with controlled operational parameters for the determination of volatile organic compounds emitted from products

[SOURCE: EN ISO 16000-9:2006, 3.6]

3.2.3
intended conditions of use
conditions that a product can experience during service life and that influence its release/emission behaviour

Note 1 to entry: These conditions are expressed in parameters such as temperature, amount of water during exposure, wetting/drying; intended conditions of use can vary for instance as a function of time, location, orientation, geographical location, etc. For simplification, intended conditions of use are transferred into release scenarios for test purposes.

3.2.4
test sample
sample, prepared from the laboratory sample, from which test portions are removed for testing or for analysis

[SOURCE: IUPAC:1997, 2.5.6]

3.2.5
test portion
quantity or volume removed from the test sample for analysis purposes, generally of known weight or volume

[SOURCE: IUPAC:1997, 2.5.7]

3.2.6
product loading factor
ratio of exposed surface area of the test specimen and the free emission test chamber volume

[SOURCE: EN ISO 16000-9:2006, 3.8]

Note 1 to entry: The product loading factor is often expressed as the ratio of the exposed area of the test specimen and the volume of the test facility (L_A expressed in m²/m³). The product loading factor can also be expressed as ratio of the exposed length, volume or unit(s) of the test specimen and the volume of the emission test facility (L_L expressed in m/m³, L_V expressed in m³/m³ or L_U expressed in u/m³).

3.2.7
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 that is tested

[SOURCE: EN ISO 16000-9:2006, 3.13]

3.2.8
air flow rate
ventilation rate
air volume entering into the emission test chamber per unit of time

[SOURCE: EN ISO 16000-9:2006, 3.2 modified – the synonym **ventilation rate** is added]

Note 1 to entry: Air flow rate is expressed in litres per second or in cubic metres per hour (l/s, m³/h).

3.2.9
air change rate
ratio of the volume of clean air brought into the emission test chamber per hour and the free emission test chamber volume measured in identical units

[SOURCE: EN ISO 16000-9:2006, 3.1]

3.2.10
specific air flow rate
q
ratio of air change rate and product loading factor

Note 1 to entry: Specific air flow rate can be expressed as the area specific air flow rate q_A, equivalent to ratio of the air flow rate and the surface area of the test specimen in [$m^3/m^2 \cdot h$], which is equivalent to the expression [m/h].

Note 2 to entry: This definition includes other specific air flow rates than only the area specific air flow rate. Specific air flow rates can also be volume specific (q_v expressed in $m^3/(m^3 \cdot h)$), length specific (q_L expressed in $m^3/(m \cdot h)$), mass specific (q_m expressed in m3/(kg · h)), or unit specific (q_u expressed in $m^3/(unit \cdot h)$).

3.2.11
emission test chamber concentration
mass concentration of a specific volatile organic compound, VOC, (or group of volatile organic compounds) in test chamber air measured in the emission test chamber outlet

[SOURCE: EN ISO 16000-9:2006, 3.7, modified – the word mass is added before concentration, VOCx has been changed to VOC and the concentration of VOC has been related explicitly to test chamber air]

3.2.12
reference room
room with conventional dimensions, climate and ventilation used as reference for any specification of emission testing and any calculation of VOC concentration in indoor air

3.2.13
mass concentration of the compound in the reference room air
mass concentration of a specific volatile organic compound, VOCs, (or group of volatile organic compounds) in a reference room

3.2.14
specific emission rate
SER (emission factor)
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

[SOURCE: EN ISO 16000-9:2006, 3.11 modified – Q_m has been deleted; SER (emission factor) has been added]

Note 1 to entry: This definition is intended to help avoid confusion between the terms q (in 3.2.10) and q (used for specific air flow rate in ISO 16000-9). The specific emission rate can be related to area, length, volume, mass or unit, expressed as SER_A in µg/(m^2·h), SER_L in µg/(m · h), SER_V in µg/(m^3·h), SER_m in µg/(kg · h), or SER_U expressed in µg/(u · h).

3.2.15
chamber blank value
test result obtained by carrying out the test procedure in the absence of a test specimen

Note 1 to entry: Blank value is expressed in micrograms per cubic metre (µg/m^3).

3.2.16
recovery
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, expressed in percent

[SOURCE: EN ISO 16000-9:2006, 3.9]

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

3.3 Terms relating to determination of emitted substances

3.3.1
volatile organic compounds
VOC
all volatile organic compounds eluting between and including n-hexane and n-hexadecane on a gas chromatographic column as specified in 11.2.2

Note 1 to entry: The measurement is carried out using a capillary column coated with 5 % phenyl/95 % methyl-polysiloxane.

Note 2 to entry: This definition corresponds to volatile organic compounds with a boiling point in the range of approximately 68 °C to 287 °C.

Note 3 to entry: Other definitions are given by the World Health Organization (WHO) 1987, ISO 16000-6, Decopaint Directive 2004/42/EC, ISO 4618 and other sources.

3.3.2
total volatile organic compounds
TVOC

sum of the concentrations of the identified and unidentified volatile organic compounds eluting between and including n-hexane and n-hexadecane on a gas chromatographic column as specified in 11.2.2

[SOURCE: EN ISO 16000-9:2006, 3.2, modified – the following was added to the definition: on a gas chromatographic column as specified in 11.2.2]

Note 1 to entry: The measurement is carried out using a capillary column coated with 5 % phenyl/95 % methyl-polysiloxane.

3.3.3
semi-volatile organic compounds
SVOC
all organic compounds which, in a capillary column as specified in 11.2.2, are eluting with a retention range between n-hexadecane (excluded) and n-docosane (included)

Note 1 to entry: The measurement is carried out using a capillary column coated with 5 % phenyl/95 % methyl-polysiloxane.

Note 2 to entry: This definition corresponds to volatile organic compounds with a boiling point higher than approximately 287 °C.

Note 3 to entry: Other definitions are given by the World Health Organization (WHO) 1987, ISO 16000-6.

3.3.4
total semi-volatile organic compounds
TSVOC
sum of the concentrations of the identified and unidentified volatile organic compounds eluting with a retention range between n-hexadecane (excluded) and n-docosane (included) on a gas chromatographic column as specified in 11.2.2

Note 1 to entry: The measurement is carried out using a capillary column coated with 5 % phenyl/95 % methyl-poly-siloxane.

3.3.5
very volatile organic compounds
VVOC
all volatile organic compounds eluting before n-hexane on a gas chromatographic column as specified in 11.2.2

Note 1 to entry: This definition corresponds to volatile organic compounds with a boiling point lower than approximately 68 °C.

Note 2 to entry: Other definitions are given by the World Health Organization (WHO) 1987, ISO 16000-6.

3.3.6
target compound
compound for which the result is compared with a compound specific limit value

3.3.7
non-target compound
compound for which the result is not compared with a compound specific limit value

3.3.8
limit value
numerical limit derived from national, European or contractual provisions

EXAMPLE National or European LCI values or classification values.

3.3.9
LCI value
Lowest Concentration of Interest
substance-specific value for health-related evaluation of the emission from products

3.3.10
***R*$_i$ value**
ratio C_i / LCI_i, where

— C_i is the chamber mass concentration of compound i;

— LCI_i is the LCI value of compound i

3.3.11
***R* value**
sum of all R_i values