

SLOVENSKI STANDARD SIST-TS CEN/TS 16516:2013

01-december-2013

Gradbeni proizvodi - Ocenjevanje sproščanja nevarnih snovi - Določevanje emisije v notranji zrak

Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air

Bauprodukte - Bewertung der Freisetzung von gefährlichen Stoffen - Bestimmung von Emissionen in die Innenraumluft TANDARD PREVIEW

Produits de construction - Détermination des émissions de substances dangereuses - Détermination des émissions dans l'air intérieur 165162013

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Ta slovenski standard je istoveten z: CEN/TS 16516-2013

ICS:

13.040.20 Kakovost okoljskega zraka Ambient atmospheres
91.100.01 Gradbeni materiali na Construction materials in splošno general

SIST-TS CEN/TS 16516:2013 en,fr,de

SIST-TS CEN/TS 16516:2013

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TECHNICAL SPECIFICATION SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CEN/TS 16516

October 2013

ICS 13.040.20; 91.100.01

English Version

Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air

Produits de construction - Détermination des émissions de substances dangereuses - Détermination des émissions dans l'air intérieur Bauprodukte - Bewertung der Freisetzung von gefährlichen Stoffen - Bestimmung von Emissionen in die Innenraumluft

This Technical Specification (CEN/TS) was approved by CEN on 25 May 2013 for provisional application.

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

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Foreword

This document (CEN/TS 16516:2013) has been prepared by Technical Committee CEN/TC 351 "Construction products - Assessment of release of dangerous substances", the secretariat of which is held by NEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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Introduction

This Technical Specification was developed in the frame of the Mandate M/366 "Development of horizontal standardized assessment methods for harmonised approaches relating to dangerous substances under the Construction Products Regulation (CPR)" addressing the preparation of horizontal measurement/test methods for the determination of emission of regulated dangerous substances from construction products into indoor air. This mandate is a complement to the product mandates granted by the European Commission to CEN under the Construction Products Regulation. The harmonised products standards (hEN) developed in CEN under mandates from the European Commission specify construction product(s) as put on the market and address their intended conditions of use.

This Technical Specification has gone through a robustness validation for identifying how small changes in specific testing parameters can influence the test result. This study also delivered data on repeatability within one testing laboratory (see Annex A). It is planned to convert the TS into an EN standard immediately after publication of this TS taking into account any relevant information provided during that process. This may include data from further round robin tests.

It is vital that such information is clearly linked to a specified product in a product standard. The responsibility of product specification is with the product TCs, as described in CEN/TR 16496. This determination of emission into indoor air is to be carried out on products under their intended conditions of use. The intended use of a construction product is generally specified in the corresponding harmonised product standard. The specific emission rates determined using this Technical Specification are associated with application of the product in a defined European Reference Room under specified climate (temperature and humidity) and ventilation conditions. A reference room is needed since it is not possible to evaluate emissions by testing in all possible use scenarios the STANDARD PREVIEW

The reference room dimensions, resulting product loading factors, as well as climate and ventilation conditions are selected to represent the general indoor environment (see Clause 4). Based on the huge amount of available European experience, it was possible to identify one emission scenario and one reference room and associated set of product loading factors to be used. S 16516:2013

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This Technical Specification specifies the horizontal reference method for testing the emission (release) of dangerous substances from construction products into indoor air. This method uses a test chamber in which emissions are generated under conditions which are kept constant during the test. These conditions are selected so that the test results can be expressed in terms of chemical concentrations in the air of the reference room (see Clause 7 and Clause 9). It is to be noted that the test chamber is defined in terms of performance requirements. This responds to the requirement of Mandate M/366 for a horizontal approach but still maintains sufficient flexibility on chamber dimensions to ensure representative samples of different materials can be accommodated (see Clause 5). Clause 8 of this Technical Specification specifies how emitted regulated dangerous substances should be analysed.

This Technical Specification also addresses separately (see Clause 11 and Annex B) indirect methods that provide, within their specific field of application, a result that is comparable or that correlates with the result of the reference method. Such methods may be easier to apply and/or be cheaper. They are in accordance with mandate M/366 provided that their comparability or correlation to the reference test method has been demonstrated in their specific field of application. They are especially suitable for Factory Production Control testing (FPC).

The selection of one emission scenario and one reference room for evaluating emissions to indoor air is in general accordance with the approach taken in existing European national regulations and voluntary schemes relating to emissions from construction products into indoor air. It also accords with the horizontal requirements of mandate M/366. The aim of this Technical Specification 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 – according to the horizontal concept specified in mandate M/366 – construction products can be evaluated under comparable conditions with regard to emissions into indoor air.

In summary, the horizontal test method specified in this Technical Specification determines the specific emission rate of volatile organic compounds from a construction product into indoor air. This can be converted into a concentration in the air of the reference room by calculation.

This Technical Specification has not been evaluated for the determination of 'steady state' concentration of formaldehyde.

NOTE A European Standard (EN 717-1) exists for the determination of formaldehyde emissions from wood-based panels, in terms of 'steady state' concentration.

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1 Scope

This Technical Specification specifies a horizontal reference method for the determination of emissions of regulated dangerous substances from construction products into indoor air. This method is applicable to volatile organic compounds, semi-volatile organic compounds, and volatile aldehydes. It is based on the use of a test chamber and subsequent analysis of the organic compounds by GC-MS or HPLC.

NOTE 1 Supplemental information is given on indirect test methods (Annex B) and on measuring very volatile organic compounds (see informative Annex C).

NOTE 2 This Technical Specification describes the overall procedure and makes use of existing standards mainly by normative reference, complemented when necessary with additional or modified normative requirements.

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.

CEN/TR 16220:2011, Construction products — Assessment of release of dangerous substances — Complement to sampling

CEN/TR 16496:2013, Construction Products — Assessment of release of dangerous substances — Use of harmonised horizontal assessment methods

EN ISO 13137, Workplace atmospheres—Pumps for personal sampling of chemical and biological agents—Requirements and test methods (standards.iteh.ai)

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)

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EN ISO 16000-11:2006, Indoor air Ad 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, definitions and abbreviations

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

NOTE Several of the defined terms on product sampling are closely related, which is also depicted in Figure 1. This figure and the relevant definitions are taken from CEN/TR 16220:2011.

3.1 Terms relating to sampling and products

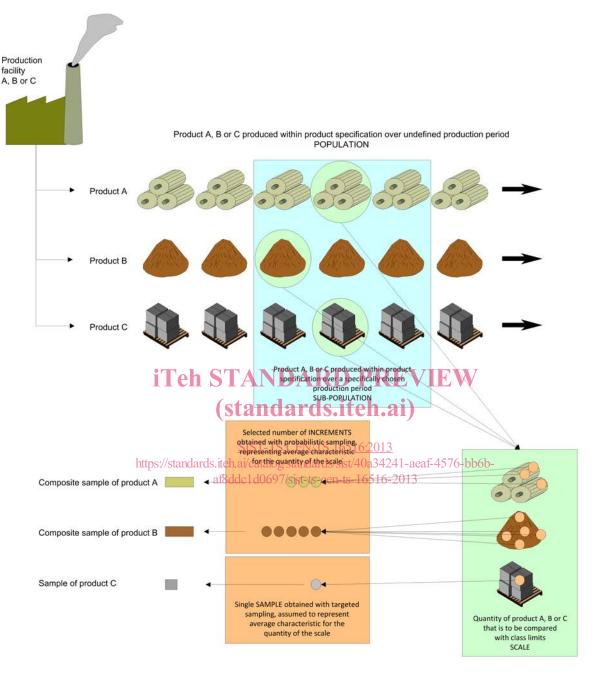


Figure 1 — Relation between the key terms of product sampling

3.1.1

composite sample

average sample, aggregated sample

sample that consists of two or more increments, put together in appropriate portions, from which the mean value of a desired characteristic may be obtained

[SOURCE: adapted from ISO 11074:2005, 4.3.3]

3.1.2 curing

hardening of freshly prepared mixtures under well-defined conditions (time, temperature, humidity, etc.) specified in harmonised product standards

3.1.3

curing time

minimal time defined necessary for curing before an emission test can be executed to perform relevant test results

3.1.4

increment

individual portion of product collected by a single operation of a sampling device which is not tested as a single entity, but is mixed with other increments in a composite sample

Note 1 to entry: Whenever the portion of product collected by a single operation of a sampling device is analysed individually, the obtained product is called a sample. In such a situation, the quantity of product should fulfil both the criteria for the size of an increment as well as for a sample.

[SOURCE: adapted from ISO 11074:2005, 4.1.8 as in CEN/TR 16220:2011, 2.4.5]

3.1.5

laboratory sample

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

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.

[SOURCE: IUPAC, 2.5.5] (standards.iteh.ai)

3.1.6

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population

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totality of items under consideration al8ddc1d0697/sist-ts-cen-ts-16516-2013

Note 1 to entry: See also the term sub-population.

[SOURCE: adapted from ISO 11074:2005, 4.1.11 as in CEN/TR 16220:2011, 2.4.3]

3.1.7

sample

portion of material selected from a larger quantity of material

Note 1 to entry: The manner of selection of the sample should be described 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.

[SOURCE: IUPAC, 2.1.1]

3.1.8

sampling plan

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

[SOURCE: CEN/TR 16220:2011, 2.3]

3.1.9

scale

minimum quantity (mass or volume) of the product for which test results are obtained

Note 1 to entry: Information on characteristics of the product, including emission and variations therein, for a quantity of product smaller than the defined scale, is judged to be not relevant for description of product properties, e.g. for evaluation of emissions into indoor air.

Note 2 to entry: Sometimes this quantity is called lot or batch.

[SOURCE: CEN/TR 16220:2011, 2.4.4]

3.1.10

sub-population

defined part of the population that is targeted for the purposes of testing

Note 1 to entry: See also the term population.

EXAMPLE Consider a continuous production process that results in a specific product. The population for that product is all the individual products produced between the moment the production process started (this may be years ago) and the moment the production process ends (this may be years ahead). From the perspective of testing, this definition does not provide a practical concept. Products produced in the past are no longer available for testing, while products that might be produced in the (far) future are neither available. The term sub-population provides a workable alternative, as the "start" and "end" of the sub-population can be defined in a practical way. For the same product, already in production for a number of years, the sub-population might be the production of a year, the production of a month, or what other definition is practical.

[SOURCE: adapted from ISO 11074:2005, 4.1.29 as in CEN/TR 16220:2011, 2.4.3]

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

3.2.1

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air change rate https://standards.iteh.ai/catalog/standards/sist/40a34241-aeaf-4576-bb6b-

ratio of the volume of air brought into the test chamber per hour and the free test chamber volume measured in identical units

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

3.2.2

air flow rate

ventilation rate

air volume entering into the emission test chamber per unit of time

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

[SOURCE: adapted from EN ISO 16000-9:2006, 3.2]

3.2.3

chamber blank value

test result obtained by carrying out the test procedure in the absence of a test portion/specimen

Note 1 to entry: Blank value is expressed in micrograms per cubic meter (µg/m³).

3.2.4

compound recovery

measured mass concentration of a target volatile organic compound in the air leaving the emission test chamber during a given time period divided by the mass concentration of the same target volatile organic compound added to the emission test chamber air in the same time period, expressed in percent

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

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

3.2.5

emission

liberation of chemical substances from a construction 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 construction 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.

3.2.6

emission test chamber

enclosure with controlled operational parameters for the determination of volatile organic compounds emitted from construction products

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

3.2.7

emission test chamber concentrations T-TS CEN/TS 16516:2013

[SOURCE: EN ISO 16000-9:2006, 3.7]

3.2.8

intended conditions of use

conditions that a product may experience during service life and that influence its release/emission behaviour

3.2.9

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

3.2.10

product loading factor

ratio of exposed dimension of the test specimen to the free test chamber volume

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 m^2/m^3). 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/m^3 , L_V expressed in m^3/m^3 or L_U expressed in u/m^3).

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

3.2.11

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

Note 1 to entry: In this Technical Specification, a reference room is specified in 4.2.

3.2.12

specific air flow rate

ratio of air change rate and product loading factor

Specific air flow rate can be expressed as the area specific air flow rate q_A , equivalent to ratio of the Note 1 to entry: air flow rate and the surface area of the test specimen in [m³/m²*h], which is equivalent to the expression [m/h].

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 $m^3/(m^3+h)$), length specific (q_i expressed in $m^3/(m^3+h)$), mass specific (q_m expressed in m³/(kg*h)), or unit specific (q_u expressed in m³/(unit*h)).

[SOURCE: adapted from EN ISO 16000-9:2006, 3.4]

3.2.13

specific emission rate SER (emission factor)

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

This definition is intended to avoid confusion between the terms q (in 3.2.12) and q (used for specific air flow rate in EN ISO 16000-9). The specific emission rate can be related to area, length, volume, mass or unit, expressed as SER_A in μg/(m²*h), SER_L in μg/(m³*h), SER_A in μg/(kg*h), or SER_U expressed in μg/(u*h).

[SOURCE: adapted from EN ISO 16000-9:200683.11]CEN/TS 16516:2013

3.2.14

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

[SOURCE: IUPAC, 2.5.7]

3.2.15

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

[SOURCE: IUPAC, 2.5.6]

3.2.16

test specimen

test portion specially prepared for emission testing in an emission test chamber in order to simulate the emission behaviour of the product under intended conditions of use

In case of floorings the test portion is a defined area of the flooring. The test specimen is prepared from this by covering the edges and the back of the flooring, because these surfaces do not have contact to the indoor air under service life conditions.

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

3.3 Terms relating to determination of emitted substances

3.3.1

LCI value

Lowest Concentration of Interest

substance-specific value for health-related evaluation of the emission from construction products

3.3.2

limit value

numerical limit derived from national, European or contractual provisions

Limit values for dangerous substances may be defined for environmental media or for product Note 1 to entry: performance like emission or content of the product.

3.3.3

non-target compound

compound for which the test result is not compared with a compound specific limit value

3.3.4

R value

sum of all R_i values

3.3.5

R_i value

Ratio C_i / LCI_i, where

C_i is the mass concentration in the air of the reference room

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LCI_i is the LCI value of compound i

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semi-volatile organic compounds itch.ai/catalog/standards/sist/40a34241-aeaf-4576-bb6b-8ddc1d0697/sist-ts-cen-ts-16516-2013

SVOC

all organic compounds which, in a gas chromatographic column as specified in 8.2.2, are eluting with a retention range between n-hexadecane (excluded) and n-docosane (included)

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

siloxane.

Note 2 to entry: This definition corresponds to volatile organic compounds with a boiling point approximately higher

than 287 °C.

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

3.3.7

target compound

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

[SOURCE: adapted from EN ISO 16000-9:2006, 3.12]