
Gradbeni proizvodi - Ocenjevanje sproščanja nevarnih snovi - 1. del: Navodilo za določanje preskusov izluževanja in dodatnih korakov preskušanja

Construction products - Assessment of release of dangerous substances - Part 1: Guidance for the determination of leaching tests and additional testing steps

Bauprodukte - Bewertung der Freisetzung von gefährlichen Stoffen - Teil 1: Leitfaden für die Festlegung von Auslaugprüfungen und zusätzlichen Prüfschritten

Produits de construction - Evaluation de l'émission de substances dangereuses - Partie 1 : Guide pour la spécification des essais de lixiviation et des étapes supplémentaires d'essai

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Ta slovenski standard je istoveten z: prEN 16637-1

ICS:

13.020.99	Drugi standardi v zvezi z varstvom okolja	Other standards related to environmental protection
91.100.01	Gradbeni materiali na splošno	Construction materials in general

oSIST prEN 16637-1:2021**en,fr,de**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 16637-1

February 2021

ICS 91.100.01

Will supersede CEN/TS 16637-1:2018

English Version

Construction products: Assessment of release of dangerous substances - Part 1: Guidance for the determination of leaching tests and additional testing steps

Bauprodukte - Bewertung der Freisetzung von gefährlichen Stoffen - Teil 1: Leitfaden für die Festlegung von Auslaugprüfungen und zusätzlichen Prüfschritten

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 351.

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European foreword

This document (prEN 16637-1:2021) 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.

This document is currently submitted to the CEN Enquiry.

This document will supersede CEN/TS 16637-1:2018.

The main changes compared to the previous edition are as follows:

- Transfer of technical specification into European Standard;
- Addition of guidance on how to identify and handle unexpected test results and how to recognize heterogeneous products (see Annex G);
- Updating of normative and informative cross-references.

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

This document deals with the determination and use of test methods for leaching of construction products taking specific situations into account. It specifies preconditions under which leaching tests for monolithic products and for granular products need to be selected.

EN 16637, *Construction products: Assessment of release of dangerous substances*, consists of the following parts:

- Part 1: *Guidance for the determination of leaching tests and additional testing steps*,
- Part 2: *Horizontal dynamic surface leaching test*,
- Part 3: *Horizontal up-flow percolation test*.

Background information on characterization of leaching behaviour of construction products can be found in Technical Reports provided by CEN/TC 351 (i.e. CEN/TR 16098 [1], CEN/TR 16496 [2]).

Introduction

The European Standards prEN 16637-1, prEN 16637-2 and prEN 16637-3 are developed to assess the release of regulated dangerous substances (RDS) from construction products into soil, surface water and groundwater in the framework of Mandate M/366. The horizontal test methods developed under the Mandate M/366 are intended to be used to show compliance with notified regulations. The tests cover the release of substances from construction products and in particular, those that are regulated in notified regulations in one or more EU Member States.

prEN 16637-1 specifies how the CEN Technical Product Committees and EOTA experts should determine the appropriate leaching test for the determination of the release of RDS from a construction product into soil, surface water and groundwater. prEN 16637-1 gives background information for CEN Technical Product Committees on the following aspects:

- a) description of the intended conditions of use of the construction product (e.g. above ground exposed to the precipitation, or shielded from direct infiltration, in surface or groundwater) with respect to the release of RDS into soil, surface water and groundwater;
- b) identification of main release mechanisms, and the appropriate leaching test for a given construction product.

prEN 16637-2 specifies a horizontal test to assess surface dependent release from monolithic, plate-like or sheet-like construction products (tank test).

prEN 16637-3 specifies a horizontal test to assess release from granular construction products.

The test methods can be used for both steps in the hierarchy (type testing (TT) and factory production control (FPC)) and form the reference tests for the intended uses and conditions specified in prEN 16637-1. In this hierarchy of testing conditionally “indirect tests” can be used, but are not specified.

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The release of substances upon contact with water results in a potential risk to the environment during the intended use of construction products. The intent of these tests is to identify the leaching behaviour of construction products and thereby allow assessments of the release of RDS from such products to soil, surface water and groundwater under intended conditions of use in relation to CE marking and assessment and verification of constancy of performance.

This document does not address impact assessment. However, since the test methods described in the document may be used in the context of impact assessments and regulation based on impact assessments, some guidance on this issue is provided in this document, Annex A (informative).

In addition to existing validation results, in 2011 CEN/TC 351 began an extensive research program on robustness validation of the existing tank leaching and percolation tests. This was carried out by a consortium of European experts on 20 construction products to unify differences from the protocols of the different CEN Members and to check the influence of testing conditions on the test result (e.g. temperature, flow rate, renewal scheme). The results ([3], [4]) of the research program confirmed the robustness of the horizontal tests known from former works. Conclusions from the program have been implemented into the Technical Specifications for the test methods. The performance of the leaching tests regarding repeatability and reproducibility was deduced from a second validation step and respective data ([5], [6]) are included in prEN 16637-2 and prEN 16637-3.

1 Scope

(1) This document allows the identification of the appropriate leaching test method for the determination of the release of RDS from construction products into soil, surface water and groundwater. This document provides a stepwise procedure for the determination of appropriate release tests, including:

- a) determination of the test method based on general product properties;
- b) choice of the test method using specific product properties.

(2) Furthermore, this document gives general guidance for CEN Technical Product Committees and EOTA WGs on basic aspects (sampling, sample preparation and storage, eluate treatment, analysis of eluates and documentation) to be specified in the relevant product standards or ETAs.

(3) Metallic products and coatings on metallic products are not considered in the determination scheme of this document since the test methods in prEN 16637-2:—¹⁾ (tank test) and prEN 16637-3:—²⁾ (column test) are not appropriate for the testing of these construction products due to a different release mechanism (solubility control).

NOTE See Annex F.

(4) It is assumed that intermittent contact with water (e.g. exposure to rainwater) is tested – by convention – as permanent contact. For some coatings, (e.g. some renders with organic binders according to EN 15824 [7]) in intermittent contact to water, physical and chemical properties might be altered in permanent contact with water. These products are not considered in the determination scheme of this document since the test method in prEN 16637-2 is not appropriate for the testing of these construction products (in this case EN 16105 [8] might be an alternative method).

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.

prEN 16637-2:—¹⁾, *Construction products: Assessment of release of dangerous substances – Part 2: Horizontal dynamic surface leaching test*

prEN 16637-3:—²⁾, *Construction products: Assessment of release of dangerous substances – Part 3: Horizontal up-flow percolation test*

EN 16687:2015, *Construction products: Assessment of release of dangerous substances – Terminology*

¹⁾ Under preparation. Stage at the time of publication: prEN 16637-2:2021.

²⁾ Under preparation. Stage at the time of publication: prEN 16637-3:2021.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16687 and the following apply.

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

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

3.1 Sampling and products

3.1.1

compacted granular product

granular product with a low permeability, due to very small pores between the particles

Note 1 to entry: Compacted granular products are usually tested by a test method for granular construction products with low hydraulic conductivity, because the percolation test is not applicable due to the low permeability of the products (e.g. fine aggregates that do not allow significant percolation of water through the solid material in a regular percolation test).

[SOURCE: EN 16687:2015 [9], 2.2.2]

3.1.2

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: EN 16687:2015 [9], 3.1.1]
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3.1.3

curing

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

[SOURCE: EN 16687:2015 [9], 3.2.6]

3.1.4

curing time

minimal time defined necessary for curing before a release/emission test can be executed to obtain test results that are relevant to in use conditions

[SOURCE: EN 16687:2015 [9], 3.2.7]

3.1.5

granular product

product composed of solid particles with a particle size smaller than a specified size or grading

Note 1 to entry: Granular products are usually tested by a percolation test.

[SOURCE: EN 16687:2015 [9], 2.2.1]

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3.1.6

increment

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

[SOURCE: EN 16687:2015 [9], 3.1.2]

3.1.7

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 subdividing, cutting, sawing, coring, mixing, drying, grinding, and curing 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: EN 16687:2015 [9], 3.2.1]

3.1.8

monolithic granular product

granular product with specific requirements on the grain size distribution to be tested in the dynamic surface leaching test (DSLTL)

[SOURCE: EN 16687:2015 [9], 2.2.3]

3.1.9

monolithic product

product which has certain minimum dimensions and physical and mechanical properties that ensure its integrity over a certain period of time in the intended conditions of use

Note 1 to entry: Monolithic products are usually tested by a dynamic surface leaching test.

[SOURCE: EN 16687:2015 [9], 2.2.4]

3.1.10

plate-like product

product formed as a semi-rigid or rigid plate, which has certain minimum dimensions and physical and mechanical properties that ensure its integrity over a certain period of time in the intended conditions of use

Note 1 to entry: Plate-like products are usually tested by a dynamic surface leaching test.

[SOURCE: EN 16687:2015 [9], 2.2.5]

3.1.11

population

totality of items under consideration

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

[SOURCE: EN 16687:2015 [9], 3.1.3]

3.1.12**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) specifying the type of sample and/or the specific step in the sampling process to which the obtained material relates.

[SOURCE: EN 16687:2015 [9], 3.1.5]

3.1.13**sampling plan**

predetermined procedure for the selection, withdrawal, on-site pre-treatment, preservation and transportation of samples to be removed from a population

[SOURCE: EN 16687:2015 [9], 3.1.6]

3.1.14**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 unimportant.

[SOURCE: EN 16687:2015 [9], 3.1.7]

3.1.15**sheet-like product**

product formed as a flexible or semi-flexible sheet, which has certain minimum dimensions and physical and mechanical properties that ensure its integrity over a certain period of time in the intended conditions of use

Note 1 to entry: Sheet-like products are usually tested by the dynamic surface leaching test.

[SOURCE: EN 16687:2015 [9], 2.2.6]

3.1.16**sub-population**

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

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 also not 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 for a year, the production for a month, or another definition that is practical.

[SOURCE: EN 16687:2015 [9], 3.1.8]

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3.1.17

test portion

analytical portion

amount of the test sample taken directly for testing/analysis purposes, usually of known weight or volume

EXAMPLE A bag of aggregates is delivered to the laboratory (the laboratory sample). For test purposes a certain amount of the aggregate is dried, the result is the test sample. Afterwards the column for a percolation test is filled with a test portion of dried aggregate.

[SOURCE: EN 16687:2015 [9], 3.2.3]

3.1.18

test sample

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

[SOURCE: EN 16687:2015 [9], 3.2.2]

3.1.19

test specimen

test portion specially prepared for emission/release/radiation testing in a test facility in order to simulate the emission/release/radiation behaviour of the product under intended conditions of use

EXAMPLE Cement is used in construction as a constituent of concrete. For testing purposes, a test specimen of concrete is prepared for the release test using cement and adding additional constituents (like aggregates) with a well-known leaching behaviour.

[SOURCE: EN 16687:2015 [9], 3.2.4]

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3.2 Release and laboratory testing

3.2.1

test method for granular construction products with low hydraulic conductivity

GLHC

release test method in which a granular construction product with low hydraulic conductivity is exposed with one defined surface to a leachant renewed at subsequent time intervals

Note 1 to entry: See also the term “tank leaching test”.

[SOURCE: EN 16687:2015 [9], 4.2.3]

3.2.3

dynamic surface leaching test

DSL T

release test method in which a monolithic, sheet-like or plate-like product is immersed in a leachant renewed at determined time intervals

Note 1 to entry: See also the term “tank leaching test”.

[SOURCE: EN 16687:2015 [9], 4.2.2]

3.2.4**eluate**

solution obtained from a leaching test

Note 1 to entry: See also the term "leachant".

[SOURCE: EN 16687:2015 [9], 4.2.7]

3.2.7**impact assessment**

general term for the entire process of assessing the concentrations of regulated dangerous substances or parameters, at the point of compliance based on the leaching test results, the source term, (or, where applicable, the façade emission function) and the modelling of environmental transport taking into account the intended conditions of use

Note 1 to entry: The final step after the impact assessment is the comparison of the predicted environmental concentrations with the environmental limit values at the point(s) of compliance, see "impact evaluation".

Note 2 to entry: Impact assessment is not part of the standardization work in CEN/TC 351. The regulator is responsible for the definition of relevant intended conditions of use, modelling of the environmental transport, the point of compliance and the limit values at the point of compliance.

[SOURCE: EN 16687:2015 [9], 4.2.21]

3.2.8**impact evaluation**

assessment of emissions/immissions

comparison of (predicted) environmental concentrations of substances/parameters with regulatory limit values (or other assessment criteria) in soil, surface water or groundwater at a point of compliance as a result of release from construction products

Note 1 to entry: Such predictions are based on the results of release tests which are translated to intended conditions of use by modelling the source term and the environmental transport.

Note 2 to entry: The translation of test results to environmental concentrations is not part of standardization work in CEN/TC 351.

[SOURCE: EN 16687:2015 [9], 4.2.20]

3.2.9**intended use**

intended use of the construction product as defined in the applicable harmonised standard or European assessment document

3.2.10**intended conditions of use**

conditions that a product may undergo 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 may 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.

[SOURCE: EN 16687:2015 [9], 4.1.16]

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3.2.11

leachant

liquid that is brought into contact with the test portion in the leaching procedure

Note 1 to entry: Usually demineralized water is used as leachant for laboratory leaching tests.

[SOURCE: EN 16687:2015 [9], 4.2.6]

3.2.12

leaching behaviour

release and change with time in release from a solid product in contact with a leachant as a function of major release controlling factors

Note 1 to entry: Such factors are diffusion, pH, L/S ratio or time.

[SOURCE: EN 16687:2015 [9], 4.2.9]

3.2.13

liquid to surface area-ratio

L/A

ratio between the volume of liquid (L) which in a given step of the test is in contact with the exposed surface area (A) of the test portion

Note 1 to entry: L/A is expressed in l/m^2 .

[SOURCE: EN 16687:2015 [9], 4.2.12]

3.2.14

liquid to solid ratio

L/S

<percolation test> ratio between the total volume of liquid (L) percolated through the solid product and of solid product (S) packed into the column

Note 1 to entry: L/S is expressed in l/kg dry matter.

[SOURCE: EN 16687:2015 [9], 4.2.13]

3.2.15

modelling of environmental transport

modelling of environmental path

transport term

modelling of immissions

theoretical estimation of the transport of substances in the environment under specific intended conditions of use based on test results or the source term for release of these substances

[SOURCE: EN 16687:2015 [9], 4.2.22]

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3.2.16**percolation test****PT**

column test

release test method to determine the release of substances from a granular construction product packed in a column with a leachant percolating through it

[SOURCE: EN 16687:2015 [9], 4.2.4]

3.2.17**point of compliance****POC**

point in an environmental medium where substance concentrations/parameters should comply with regulatory limit values for soil, groundwater and/or surface water at a certain distance from the source

[SOURCE: EN 16687:2015 [9], 4.2.25]

3.2.18**regulated dangerous substances****RDS**

in the context of the CPR dangerous/hazardous substances, ions and radioactive substances that may present a danger for man or the environment during normal use of construction products when installed in works and for which at least one European Member State has notified a law, regulation or administrative provision or the European Union has a Community provision

[SOURCE: EN 16687:2015 [9], 2.1.6]

3.2.19**release****emission**

<leaching> liberation of chemical substances (e.g. non-volatile organic compounds, heavy metals, salts) from a construction product into soil, surface water or groundwater or into the leachant of a test facility

Note 1 to entry: Release to soil, surface water and groundwater may be expressed in terms of area related release (tank leaching test, e.g. mg/m²) or in terms of mass related release (percolation test, e.g. mg/kg).

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

[SOURCE: EN 16687:2015 [9], 4.2.15]

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