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English Version

Construction products - Assessment of release of dangerous substances - Part 2: Horizontal dynamic surface leaching test

Produits de construction - Evaluation de l'émission de substances dangereuses - Partie 2: Essais horizontaux et dynamiques de la lixivation des surfaces

Bauprodukte - Bewertung der Freisetzung von gefährlichen Stoffen - Teil 2: Horizontale dynamische Oberflächenauslaugprüfung

This Technical Specification (CEN/TS) was approved by CEN on 25 February 2014 for provisional application.

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Contents

Page

| | |
|---|-----------|
| Foreword..... | 4 |
| Introduction | 5 |
| 1 Scope | 7 |
| 2 Normative references | 7 |
| 3 Terms and definitions | 8 |
| 4 Symbols and abbreviations | 11 |
| 5 Principle | 12 |
| 6 Reagents | 13 |
| 7 Equipment | 13 |
| 8 Sample preparation | 14 |
| 8.1 General..... | 14 |
| 8.2 Provisions on test sample and test portion..... | 14 |
| 8.3 Determination of the geometric surface area | 16 |
| 8.3.1 General..... | 16 |
| 8.3.2 Regular test pieces..... | 16 |
| 8.3.3 Test pieces with partly irregular side face | 16 |
| 8.3.4 Irregular test pieces without any regular sides | 17 |
| 9 Test procedure | 17 |
| 9.1 Testing conditions | 17 |
| 9.2 Step 1 of the leaching procedure | 18 |
| 9.3 Steps 2 – 8 of the leaching procedure | 19 |
| 9.4 Measuring the loss of weight | 20 |
| 9.5 Further preparation of the eluates for analysis and analysis steps | 20 |
| 9.6 Blank test..... | 20 |
| 10 Evaluation of measurement results | 21 |
| 10.1 Expression of results in concentrations | 21 |
| 10.2 Expression of results in terms of area related release | 21 |
| 10.3 Calculation of release mechanism | 22 |
| 10.4 Calculating the loss of weight | 22 |
| 11 Documentation and test report | 22 |
| 12 Test performance..... | 24 |
| 13 Indirect methods | 24 |
| 13.1 Definition | 24 |
| 13.2 Provisions..... | 24 |
| 13.3 Examples of "indirect" methods | 24 |
| Annex A (normative) Method for Granular construction products with Low Hydraulic Conductivity (GLHC) | 25 |
| A.1 Scope | 25 |
| A.2 Terms, definitions and abbreviations | 25 |
| A.3 Principle | 25 |

| | | |
|---------------------|--|-----------|
| A.4 | Equipment | 25 |
| A.5 | Sampling..... | 26 |
| A.6 | Procedure | 26 |
| A.7 | Data handling and reporting..... | 30 |
| Annex B | (normative) Assessment of release mechanisms (if required) | 31 |
| B.1 | Overview of release mechanisms | 31 |
| B.2 | Procedure of identification of release mechanisms | 32 |
| B.3 | Concentrations close to the limit of quantification | 33 |
| B.4 | Diffusion controlled release of a substance | 34 |
| B.5 | Dissolution controlled release of a substance | 36 |
| B.6 | Other release mechanism | 37 |
| B.7 | Calculation of release | 39 |
| B.8 | Examples | 41 |
| Annex C | (informative) Examples of the test set up for construction products (DSL_T) | 56 |
| Annex D | (informative) Examples of data about the <i>L/A</i> ratio | 57 |
| Bibliography | | 58 |

Foreword

This document (CEN/TS 16637-2:2014) 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.

This Technical Specification was elaborated on the basis of CEN/TS 15863 [1], which is based on NEN 7375:2005 [2].

This Technical Specification specifies a dynamic surface leaching test for determination of surface dependent release of substances from monolithic or plate-like or sheet-like construction products or granular construction products with low hydraulic conductivity under standardized conditions.

CEN/TS 16637-1 deals with the determination and use of test methods for leaching of construction products taking specific situations into account. Technical Specification FprCEN/TS 16637-3 (in preparation) specifies an up-flow percolation test to determine the leaching behaviour of granular construction products under standardized percolation conditions.

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 [3], CEN/TR 16496 [4]).

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The informative introduction describes the interactions and interrelations between the three Technical Specifications CEN/TS 16637-1, CEN/TS 16637-2 and FprCEN/TS 16637-3 (in preparation) developed to assess the release of dangerous substances from construction products into soil, surface water and ground water in the framework of the 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.

CEN/TS 16637-1 specifies how the CEN Technical Product Committees and EOTA experts are to determine the appropriate release method for the determination of the release of Regulated Dangerous Substances from a construction product into soil, surface water and groundwater.

CEN/TS 16637-2 and FprCEN/TS 16637-3 (in preparation) contain the two horizontal leaching tests that are needed to address the leaching properties of the construction products. CEN/TS 16637-2 describes a test to assess surface dependent release from monolithic, plate-like or sheet-like construction products while FprCEN/TS 16637-3 (in preparation) describes a test to assess release from granular construction products. The test methods specified in CEN/TS 16637-2 and FprCEN/TS 16637-3 (in preparation) can be used for both steps in the hierarchy (type testing and factory production control) and are supposed to be used as the reference test for the intended uses and conditions specified in CEN/TS 16637-1. In this hierarchy of testing conditionally "indirect tests" can be used, but are not specified.

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 Regulated Dangerous Substances from such products to soil, surface water and groundwater under intended conditions of use in relation to CE marking.

Technical Product Committees are expected to apply the test standards developed in CEN/TC 351 for their products in order to test the potential release of Regulated Dangerous Substances to soil, surface water and groundwater. CEN/TS 16637-1 is intended to provide clear procedures to determine which test method is appropriate for a given product. CEN/TS 16637-1 aims to provide the information, needed in a CEN Technical Product Committee, on how to deal with the relevant test method(s) to enable the producer to declare a performance in the CE marking as a result of the test. CEN Technical Product Committees are referred to the informative Annex A and Annex B of CEN/TS 16637-1:2014 and to CEN/TR 16098, [3], for background information on the following aspects:

- a) identification of the products addressed in the product standards which have relevance with respect to the release of dangerous substances into soil, surface water and groundwater (products only applied in the interior of buildings are not subject to testing for these properties);
- b) 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 ground water) in respect to the release of Regulated Dangerous Substances into soil, surface water and groundwater;
- c) identification of main release mechanisms.

Impact assessment is not part of the work of CEN/TC 351.

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 in different CEN Member States and to check the influence of testing conditions on the test result (e.g. temperature, flow rate, renewal scheme, etc. [5]). The results 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. However, the performance of the leaching test regarding repeatability and reproducibility is dependent on the tested construction product and on the testing conditions. When these Technical Specifications of the horizontal leaching tests are adopted by CEN, the leaching tests referred to in these Technical Specifications will not yet be fully validated. No data will be available on repeatability and reproducibility for the range of construction products. For other, sometimes comparable, matrices performance data are available from national as well as EU validation studies.

1 Scope

(1) This Technical Specification specifies a Dynamic Surface Leaching Test (DSLTL) which is aimed at determining the release per unit surface area as a function of time of inorganic and/or non-volatile organic substances from a monolithic, plate- or sheet-like product, when it is put into contact with an aqueous solution (leachant). The test method is not suitable for substances that are volatile under ambient conditions.

(2) This test is a parameter specific test focusing on identifying and specifying parameter specific properties tested under specified conditions. It is not aimed at simulating real situations. The application of results to specific intended conditions of use may be established by means of modelling (not included in this Technical Specification).

(3) The modification for granular construction products with low hydraulic conductivity (Annex A) applies for granular particles with so little drainage capacity between the grains that percolation in percolation tests and in practice is nearly impossible.

(4) The test method applies to more or less regularly shaped test portions consisting of monolithic test pieces with minimum dimensions of 40 mm in all directions (volume $> 64\,000\text{ mm}^3$ (64 cm^3)). It also applies to plate- or sheet-like products with surface areas of minimum $10\,000\text{ mm}^2$ (100 cm^2) exposed to the leachant. Products designed to drain water (e.g. draining tiles, porous asphalt) and monolithic granular products according to CEN/TS 16637-1:2014, Table 1, are also tested by this test method. All products to be tested are assumed to maintain their integrity over a time frame relevant for the considered intended use.

(5) Metals, metallic coatings and organic coatings on metals are excluded from the scope of CEN/TS 16637-2 because the principles of this test (diffusion) are not obeyed by these products. Guidance on the need for testing of these products is under consideration.

(6) For some coatings (e.g. some renders with organic binders according to EN 15824) in intermittent contact to water, physical and chemical properties might be changed in permanent contact with water. For these products CEN/TS 16637-2 is not appropriate.

(7) Guidance on the applicability of the test method to a given product is outlined in CEN/TS 16637-1.

NOTE 1 This test method is only applicable if the product is chemically stable and the matrix does not dissolve. For construction products that may be used in contact with water this usually should not be the case as construction products should then be dimensionally stable. If a product may substantially wear in its intended use, the test cannot provide proper information. If the product contains a substantial amount of water-soluble compounds, e.g. gypsum or anhydrite, the matrix may (partially) dissolve and lead to dimensional instability of the test piece. In this case the test standard also cannot be used.

NOTE 2 Volatile organic substances include the low molecular weight substances in mixtures such as mineral oil.

NOTE 3 It is not always possible to optimize test conditions simultaneously for inorganic and organic substances and optimum test conditions may also vary between different groups of organic substances. Test requirements for organic substances are generally more stringent than those for inorganic substances. The test conditions suitable for measuring the release of organic substances will generally also be applicable to inorganic substances.

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 14346, *Characterization of waste - Calculation of dry matter by determination of dry residue or water content*

EN 16192, *Characterization of waste - Analysis of eluates*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696)*

EN ISO 5667-3, *Water quality - Sampling - Part 3: Preservation and handling of water samples (ISO 5667-3)*

CEN/TS 16637-1, *Construction products - Assessment of release of dangerous substances - Part 1: Guidance for the determination of leaching tests and additional testing steps*

3 Terms and definitions

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

3.1

eluate

solution recovered from a leaching test

3.2

laboratory sample

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

[SOURCE: IUPAC 1990 [6], 2.5.5]

Note 1 to entry: When the laboratory sample is further prepared by subdividing, cutting, sawing, coring, drying, grinding, mixing, 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 or for analysis.

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.

3.3

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.

3.4

leaching behaviour

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

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

3.5

release mechanism

physico-chemical processes that control the release of substances from a solid construction product into a leachant

Note 1 to entry: In the case of monolithic products, the main release mechanisms for substances are diffusion, dissolution, initial surface wash-off and depletion. Additional factors like pH or DOC also have influence on the magnitude of the release.

Note 2 to entry: The release mechanism for every substance can be determined using the results of the release test (tank leaching test). Determination of the release mechanism is relevant for modelling of the source term and so for determination of the effects on soil and water over a time period.