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NSAI Standards

Irish Standard Recommendation
S.R. CEN/TS 15864:2015

Characterization of waste - Leaching behaviour test for basic characterization - Dynamic monolithic leaching test with continuous leachant renewal under conditions relevant for specified scenario(s)

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S.R. CEN/TS 15864:2015

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This document is based on:	*Published:*
CEN/TS 15864:2015	2015-11-25

This document was published under the authority of the NSAI and comes into effect on:	ICS number:
2015-12-16	13.030.10
	NOTE: If blank see CEN/CENELEC cover page

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National Foreword

S.R. CEN/TS 15864:2015 is the adopted Irish version of the European Document CEN/TS 15864:2015, Characterization of waste - Leaching behaviour test for basic characterization - Dynamic monolithic leaching test with continuous leachant renewal under conditions relevant for specified scenario(s)

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TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CEN/TS 15864

November 2015

ICS 13.030.10

Supersedes CEN/TS 15864:2012

English Version

Characterization of waste - Leaching behaviour test for basic characterization - Dynamic monolithic leaching test with continuous leachant renewal under conditions relevant for specified scenario(s)

Caractérisation des déchets - Essais de comportement à la lixiviation pour la caractérisation de base - Essai de lixiviation dynamique des monolithes avec renouvellement continu du lixiviant dans des conditions pertinentes pour des scénarios spécifiés

Charakterisierung von Abfällen - Untersuchung des Elutionsverhaltens für die grundlegende Charakterisierung - Dynamisches Elutionsverfahren für monolithische Abfälle mit kontinuierlicher Erneuerung des Elutionsmittels unter Bedingungen für festgelegte Szenarien

This Technical Specification (CEN/TS) was approved by CEN on 19 October 2015 for provisional application.

The period of validity of this CEN/TS 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 CEN/TS can be converted into a European Standard.

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

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Contents

Page

European foreword ... 4
Introduction ... 5
1 Scope ... 7
2 Normative references ... 7
3 Terms and definitions ... 8
4 Principle ... 11
5 Reagents ... 12
6 Equipment ... 12
6.1 General ... 12
6.2 Laboratory equipment ... 12
7 Sample preparation ... 13
7.1 General ... 13
7.2 Preparation of the test portion ... 14
7.3 Determination of the geometric surface area ... 14
8 Procedure ... 14
8.1 Testing conditions ... 14
8.1.1 General case (intermediate range of renewal rate) ... 14
8.1.2 Particular case “critical renewal rate” ... 16
8.1.3 Particular case “low renewal rate” ... 16
8.1.4 Particular case under fixed conditions when no specific scenario is under consideration (“not scenario-related”) ... 16
8.2 Test procedure ... 17
8.3 Contact periods – collection scheme ... 18
8.4 Weight loss of the monolithic waste during the test ... 18
8.5 Further preparation of the eluates for analysis ... 18
8.6 Blank test ... 19
9 Calculations ... 19
9.1 Expression of results ... 19
9.1.1 General ... 19
9.1.2 Expression of results in concentrations ... 19
9.1.3 Expression of result in terms of surface related release ... 20
9.2 Average surface-related release rate ... 20
10 Performance characteristics ... 21
11 Documentation and test report ... 21
11.1 General ... 21
11.2 General data ... 21
11.3 Leaching test conditions ... 21
11.4 Analytical report ... 22
11.5 Results of the leaching test ... 22
Annex A (informative) Identification of release mechanisms and use of test results ... 23
A.1 Introduction ... 23
A.2 Examples of factors influencing the leaching of monolithic waste ... 23

This is a free page sample. Access the full version online.

A.3 Long term release prediction 26

Annex B (normative) Particular case "renewal rate without retro-action" 27
B.1 Introduction 27
B.2 Determination of the critical surface-related flow rate 27

Annex C (informative) Examples of scheme of installation 29

Annex D (normative) Particular case "low renewal rate" 31
D.1 Introduction 31
D.2 Procedure 31

Annex E (informative) Process map for CEN/TS 15864 33

Bibliography 35

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European foreword

This document (CEN/TS 15864:2015) has been prepared by Technical Committee CEN/TC 292 "Characterization of waste", 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 shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 15864:2012.

The following significant technical change has been implemented in this new edition of the text:

— the steps/fractions for eluates collection have been harmonized with EN 15863.

This document has been developed primarily to support the requirements for leaching behaviour testing within EU and EFTA countries.

This document was elaborated on the basis of:

— AFNOR XP X30-450:2002;

— AFNOR XP X30-467:2002;

— AFNOR XP X30-469:2007.

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.

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Introduction

This document specifies a dynamic leaching test for monolithic waste materials, to determine key parameters to address the leaching behaviour of monolithic waste materials.

For the complete characterization of the leaching behaviour of waste under specified conditions the application of other test methods is required (see EN 12920).

Anyone dealing with waste and sludge analysis should be aware of the typical risks of that kind of material irrespective of the parameter to be determined. Waste and sludge samples can contain hazardous (e.g. toxic, reactive, flammable, infectious) substances, which can be liable to biological and/or chemical reaction.

Consequently these samples should be handled with special care. Gases which can be produced by microbiological or chemical activity are potentially flammable and will pressurize sealed bottles. Bursting bottles are likely to result in hazardous shrapnel, dust and/or aerosol. National regulations should be followed with respect to all hazards associated with this method.

In the different European countries, tests have been developed to characterize and assess the constituents which can be leached from waste materials. The release of soluble constituents upon contact with water is regarded as one of the main mechanism of release which results in a potential risk to the environment during life-cycle of waste materials (disposal or re-use scenario). The intent of these tests is to identify the leaching properties of waste materials. The complexity of the leaching process makes simplifications necessary. Not all of the relevant aspects of leaching behaviour can be addressed in one single standard.

Procedures to characterize the behaviour of waste materials can generally be divided into three steps, using different tests in relation to the objective. The following test hierarchy is taken from the Landfill Directive[1)] and the Decision on Annex II of this Directive[2)] for disposal of waste.

a) Basic characterization constitutes a full characterization of the waste by gathering all the necessary information for a safe management of the waste in the short and long term. Basic characterization may provide information on the waste (type and origin, composition, consistency, leachability, etc.), information for understanding the behaviour of waste in the considered management scenario, comparison of waste properties against limit values, and detection of key variables (critical parameters as liquid/solid (L/S) ratios, leachant composition, factors controlling leachability such as pH, redox potential, complexing capacity and physical parameters) for compliance testing and options for simplification of compliance testing. Characterization may deliver ratios between test results from basic characterization and results from simplified test procedures as well as information on a suitable frequency for compliance testing. In addition to the leaching behaviour, the composition of the waste should be known or determined by testing. The tests used for basic characterization should always include those to be used for compliance testing.

b) Compliance testing is used to demonstrate that the sample of today fits the population of samples tested before by basic characterization and through that, is used to carry out compliance with regulatory limit values. The compliance test should therefore always be part of the basic characterization program. The compliance test focuses on key variables and leaching behaviour identified by basic characterization tests. Parts of basic characterization tests can also be used for compliance purposes.

1) Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

2) Council Decision 2003/33/EC of 19 December 2002.

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c) On-site verification tests are used as a rapid check to confirm that the waste is the same as that which has been subjected to characterization or compliance tests. On-site verification tests are not necessarily leaching tests.

The test procedure described in this document is a basic characterization test and falls in category a).

According to EN 12920 the evaluation of the release of constituents from waste materials in a certain scenario involves the performance of various tests. This document describes one of the parametric test that can be used for such purposes, especially for monolithic waste.

The test procedure allows the determination of the release under dynamic conditions of constituents from a monolithic waste material, as a function of time. This release is calculated from the concentrations of the constituents measured in the solution (eluate) that is collected in a certain number of separate fractions.

The composition, the temperature and the renewal rate of this solution are chosen for the test in order to study the behaviour of the waste material under fixed conditions when no specific scenario is under consideration or according to the conditions defined by the disposal or utilization scenario under consideration.

Three main ranges of renewal rates can be distinguished and addressed by this document:

— high renewal rate above a so-called “critical renewal rate” for which the released elements do not influence the release (so-called “no retro-action situation”);

— “low renewal rate” which corresponds to a quasi “saturation” of the solution in the reactor in order to reach stationary conditions (i.e. close to “saturation” equilibrium);

— intermediate range for which the released elements influence the release, but the concentrations remain significantly below saturation.

Results of this test, combined with those from other tests (e.g. EN 14429) and the use of more or less sophisticated models, allow the identification of the main leaching mechanisms that can be distinguished, such as diffusion, dissolution of constituents, initial surface wash-off, dissolution of the matrix (see Annex A). These intrinsic properties can be used to predict the release of constituents at a given time frame, in order to assess the leaching behaviour of monolithic waste materials in practical situations or scenarios as defined in EN 12920.

NOTE At low L/A conditions, pore water conditions in monolithic specimens can be approached.

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1 Scope

This Technical Specification is applicable for determining the leaching behaviour of monolithic wastes under dynamic conditions. The test is performed under experimental conditions relevant to assess the leaching behaviour in view of the considered scenario(s). This test is aimed at determining the release as a function of time of inorganic constituents from a monolithic waste, when it is put into contact with an aqueous solution (leachant).

In general, the composition, the temperature and the continuous renewal rate of the leachant are chosen such that the leaching behaviour of the waste material can be studied in view of the considered disposal or recovery scenario. When the release needs to be determined without any reference to a specific scenario, the leachant is demineralized water, the temperature and the continuous renewal rate are fixed.

This dynamic monolithic leaching test (DMLT) is a parameter specific test as specified in EN 12920 and is therefore not aimed at simulating real situations. The application of this test method alone is not sufficient for the determination of the detailed leaching behaviour of a monolithic waste under specified conditions.

In the framework of EN 12920 and in combination with additional chemical information, the test results are used to identify the leaching mechanisms and their relative importance. The intrinsic properties can be used to predict the release of constituents at a given time frame, in order to assess the leaching behaviour of monolithic waste materials, placed in different situations or scenarios (including disposal and recycling scenarios).

The test method applies to regularly shaped test portions of monolithic wastes with minimum dimensions of 40 mm in all directions that are assumed to maintain their integrity over a time frame relevant for the considered scenario. The test method applies to test portions for which the geometric surface area can be determined with the help of simple geometric equations. The test method applies to low permeable monolithic materials.

NOTE 1 If, in order to comply with the requirements of regular shape, the test portion is prepared by cutting or coring, then new surfaces are exposed which can lead to change(s) in leaching properties. On the other hand if the test portion is prepared by moulding, the surface will be dependent to the type of mould and the conditions of storage. If the intention is to evaluate the behaviour of the material core, the specimen needs to be stored without any contact with air to avoid carbonation.

NOTE 2 For monolithic waste materials with a saturated hydraulic conductivity higher than 10^{-8} m·s^{-1}, water is likely to percolate through the monolith rather than flow around it. In such cases, relating the release to the geometric surface can lead to misinterpretation. A percolation test is then more appropriate (e.g. CEN/TS 14405).

This procedure may not be applicable to materials reacting with the leachant, leading for example to excessive gas emission or an excessive heat release.

This document has been developed to determine the release of mainly inorganic constituents from wastes. It does not take into account the particular characteristics of organic constituents nor the consequences of microbiological processes in organic degradable wastes.

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*

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