Irish Standard
I.S. EN 14405:2017

Characterization of waste - Leaching behaviour test - Up-flow percolation test (under specified conditions)

I.S. EN 14405:2017

Incorporating amendments/corrigenda/National Annexes issued since publication:

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National Foreword

I.S. EN 14405:2017 is the adopted Irish version of the European Document EN 14405:2017, Characterization of waste - Leaching behaviour test - Up-flow percolation test (under specified conditions)

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14405

March 2017

ICS 13.030.10

Supersedes CEN/TS 14405:2004

English Version

Characterization of waste - Leaching behaviour test - Up-flow percolation test (under specified conditions)

Caractérisation des déchets - Essais de comportement à la lixiviation - Essai de percolation à écoulement ascendant (dans des conditions spécifiées)

Charakterisierung von Abfällen - Untersuchung des Elutionsverfahrens - Perkolationsprüfung im Aufwärtsstrom (unter festgelegten Bedingungen)

This European Standard was approved by CEN on 3 February 2017.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword

This document (EN 14405:2017) has been prepared by Technical Committee CEN/TC 444 “Test methods for environmental characterization of solid matrices”, the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by September 2017, and conflicting national standards shall be withdrawn at the latest by September 2017.

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 14405:2004.

The following significant technical changes have been implemented in this new edition of the text:

— the status of the document has been changed from Technical Specification (CEN/TS) into a European Standard;

— based on CEN ISO/TS 21268-3 and CEN/TS 16637-3 the option for analysis of non-volatile organic substances has been added;

— performance data for inorganic substances has been added (see Annex D).

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

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

This European Standard was elaborated on the basis of:

— NEN 7343:1995;

— NT ENVIR 002:1995.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard specifies an up-flow percolation test to determine the leaching behaviour of inorganic and non-volatile organic substances from granular waste materials under standardized percolation conditions.

NOTE Validation data for non-volatile organic substances are not currently available, but will be added on revision when available.

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 will 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 substances which can be leached from waste materials. The release of soluble substances 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.

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).

1 Scope

This European Standard is applicable for determining the leaching behaviour of inorganic and non-volatile organic substances from granular waste (without or with size reduction (see 7.2)). The waste body is subjected to percolation with water as a function of liquid to solid ratio under specified percolation conditions. The waste is leached under hydraulically dynamic conditions. The method is a once-through column leaching test and the test results establish the distinction between different release patterns, for instance wash-out and release under the influence of interaction with the matrix, when approaching local equilibrium between waste and leachant. This test method produces eluates, which can subsequently be characterized by physical, chemical and ecotoxicological methods according to existing standard methods.

NOTE 1 The mentioned specified percolation conditions are arbitrary and are not necessarily simulating a specific scenario.

NOTE 2 Waste materials that show a saturated hydraulic conductivity between 10^{-7} m/s and 10^{-8} m/s can be subjected to this test, but it can be difficult to maintain the imposed flow rate. If a waste shows a saturated hydraulic conductivity below 10^{-8} m/s, the test will preferably not be carried out (See C.5 for a definition of 'hydraulic conductivity').

NOTE 3 This procedure is generally not applicable to biologically degrading materials and materials reacting with the leachant, leading, for example, to excessive gas emission or excessive heat release.

NOTE 4 This procedure is applicable to materials showing solidification in the column, if the final hydraulic conductivity is within the specified range (see NOTE 2).

NOTE 5 It is not always possible to optimise test conditions simultaneously for inorganic and non-volatile organic substances and optimum test conditions may also vary between different groups of non-volatile organic substances. Test requirements for non-volatile organic substances are generally more stringent than those for inorganic constituents. The test conditions suitable for measuring the release of non-volatile organic substances will generally also be applicable to inorganic substances.

NOTE 6 For ecotoxicological testing, eluates representing the release of both inorganic and non-volatile organic substances are needed. In this standard ecotoxicological testing is meant to include also genotoxicological testing.

NOTE 7 Validation data for non-volatile organic substances are not currently available, but will be added on revision when available.

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 14899, *Characterization of waste - Sampling of waste materials - Framework for the preparation and application of a Sampling Plan*

EN 15002, *Characterization of waste - Preparation of test portions from the laboratory sample*

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)*