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Characterization of waste - Methodology for the determination of the leaching behaviour of waste under specified conditions

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Charakterisierung von Abfall - Vorgehensweise zur Bestimmung des Auslaugungsverhaltens von Abfall unter festgelegten Bedingungen

Caractérisation des déchets - Méthodologie pour la détermination du comportement à la lixiviation d'un déchet dans des conditions spécifiées

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## Characterization of waste - Methodology for the determination of the leaching behaviour of waste under specified conditions

Caractérisation des déchets - Méthodologie pour la détermination du comportement à la lixiviation d'un déchet dans des conditions spécifiées

Charakterisierung von Abfall - Vorgehensweise zur Bestimmung des Auslaugungsverhaltens von Abfall unter festgelegten Bedingungen

This European Standard was approved by CEN on 6 February 2006 and includes Amendment 1 approved by CEN on 30 July 2008.

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## Foreword

This document (EN 12920:2006+A1:2008) has been prepared by Technical Committee CEN/TC 292 "Characterization of Waste", 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of an identical text or by endorsement, at the latest by March 2009, and conflicting national standards shall be withdrawn at the latest by March 2009.

This document includes Amendment 1, approved by CEN on 2007-07-30.

This document supersedes A1 EN 12920:1997 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

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

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**EN 12920:2006+A1:2008 (E)****Introduction**

The purpose of this standard is to provide a methodology for the determination of the leaching behaviour of a waste under specified conditions i.e. in a disposal or recovery scenario within a specified time frame. The methodology is designed to ensure that waste specific properties and scenario conditions are taken into account. The methodology contains several steps, some of which make use of chemical, biological, physical and leaching tests. A selection of tests is made depending on the objective, that is the definition of the problem and the solution sought, the waste under consideration and the scenario to be evaluated.

It is recognised that based on the present state of knowledge it is not always possible to provide a clear solution.

Determination of leaching behaviour in the context of this methodology may provide information with relatively large uncertainties.

To avoid unnecessary duplication of work, reference can be made to existing documented information on specific waste characteristics and on previous evaluations of existing documented scenarios, provided that such reference is documented and justified in the study report for each step of the methodology to which it applies.

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## 1 Scope

This standard specifies a methodology for the determination of the leaching behaviour of waste under specified conditions (i.e. for a specified scenario including a specified time frame) in order to provide a solution to a defined problem. This applies to disposal and recovery scenarios.

NOTE 1 Recovery is the term defined in the European Waste Acts [1,3]. It includes re-use and recycling. <sup>A1</sup> The term "waste" includes all categories of waste, such as municipal waste, waste from extractive industry etc. <sup>A1</sup>

The external conditions which have a direct influence on the release of constituents from waste are considered. Migration of constituents leached from the disposal or the recovery site into the surrounding environment is not considered. Also the assessment of toxicity to humans or ecological impacts on flora and fauna as a secondary effect after release of constituents from the waste is not considered.

NOTE 2 Present knowledge of highly complex scenarios and wastes may limit the ability to provide a clear solution to a defined problem. An example may be the land filling of complex mixtures of wastes <sup>A1</sup> or the prediction of the acid generation behaviour waste from the extractive industry <sup>A1</sup>.

## 2 Terms and definitions

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

### 2.1 scenario

description of a set of normal and exceptional conditions relevant to a particular disposal or recovery situation for wastes for the determination of the leaching behaviour within a specified time frame

NOTE Disposal is defined in European Directive 91/156/EEC of 18 March 1991[1].

### 2.2 release

emission of constituents from waste which pass through the external surface of a waste mass as specified in the considered scenario

### 2.3 leaching behaviour of a waste

release and change with time in release from the waste upon contact with a leachant under the conditions specified in the scenario, especially within the specified time frame

NOTE Besides time, factors influencing the leaching behaviour may be liquid/solid ratio, pH, redox potential, complexation and particle size distribution.

### 2.4 parameter specific test

test aimed at measuring an intrinsic property of waste or the (interrelated) influence of specific parameters on the release from waste in the considered scenario

NOTE 1 Examples of intrinsic properties of waste are: diffusion coefficients, solubility, physical properties, etc.

NOTE 2 Examples of specific parameters influencing the leaching behaviour are: temperature, pH, liquid/solid ratio, redox potential, the flow rate of leachant, chemical properties, etc.

### 2.5 simulation test

test aimed at simulating the combined effect of various parameters on the release in the scenario under consideration

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NOTE 1 A simulation test may be an accelerated test; care should be taken in the use of acceleration tests for model validation purposes.

NOTE 2 Examples of simulation tests are lysimeter tests and large-scale column tests.

**2.6 behavioural model**  
set of relationships between on the one hand the leaching behaviour and on the other hand the relevant conditions of the considered scenario (especially the specified time frame) as well as the relevant properties of the waste under consideration

NOTE The behavioural model can vary in sophistication depending on the definition of the problem and the solution sought.

**A1) 2.7****acid generation behaviour of a waste**

release and change with time in release of low pH drainage derived from materials with an insufficient capacity to neutralize the acidic products of sulfide and elemental sulfur oxidation and the dissolution products of acid producing minerals and amorphous materials

NOTE Such behaviour occurs when the neutralisation potential is no longer capable of maintaining neutral pH conditions in a measurable volume of drainage. In the context of mining, this is referred to as acid rock drainage (ARD) or acid mine drainage (AMD). A1)

**3 Description of the steps in the methodology**

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**3.1 Outline**

The methodology consists of the following steps:

- a) definition of the problem and the solution sought;
- b) description of the scenario;
- c) description of the waste;
- d) determination of the influence of parameters on leaching behaviour;
- e) modelling of the leaching behaviour;
- f) behavioural model validation;
- g) conclusions;
- h) study report.

These steps are to be carried out to determine the leaching behaviour of the waste in the considered scenario to provide the solution sought to the defined problem (see Annex A).

NOTE To avoid unnecessary duplication of work, reference can be made to existing documented information on specific waste characteristics and on previous evaluations of scenarios.

In order to comply with this standard, reference to existing information shall be documented and justified in the study report for each step of the methodology to which it applies.



### 3.2 Step 1: Definition of the problem and the solution sought

The first step, in all cases, consists of defining the problem and the solution sought. This requires information on:

- the scenario;
- the waste  $\boxed{A_1}$  or anticipated waste  $\boxed{A_1}$ .

NOTE 1 Type(s) of waste may be referred to using the categorisation of the European Waste lists defined by the Commission decision 2000/532/EC of 3 May 2005 [2].

NOTE 2 Nature of the solution sought may be e.g.:

- forecast of a property of the waste after a specified time; e.g. release
- comparison of treatment options;
- data relating to regulatory requirements.

$\boxed{A_1}$  NOTE 3 In the case of waste from the extractive industry, predictions of anticipated or expected waste characteristics should be made from information gathered on the material obtained during exploration prior to actual excavation.  $\boxed{A_1}$

### 3.3 Step 2: Description of the scenario

This step consists of describing the normal and exceptional conditions which may influence properties (e.g. the release) of the waste under consideration in the considered disposal or recovery scenario. This especially includes the time frame relevant for the prediction of the waste behaviour.

Consequently the scenario shall be described by providing relevant details from the following items:

- mechanical and geotechnical conditions; <https://standards.iteh.ai/catalog/standards/sist/a39bb7ed-98d0-42e4-9229-cc0ca0107149/sist-en-12920-2006a1-2009>
- hydrogeological and climatic conditions;
- biological conditions  $\boxed{A_1}$  and mineral context  $\boxed{A_1}$ ;
- conditions for the use of the site at different points in time;
- exceptional conditions.

NOTE 1 Description of mechanical and geotechnical conditions can include the proposed preparation of the waste (including sorting, crushing, compaction etc.) or the dimensions of the disposal/recovery site, nature and thickness of layers above, below and around the waste, bulk density and expected lifetime of the containment system.

$\boxed{A_1}$  NOTE 2 Description of hydrogeological conditions can include: sources of leachant ingress, infiltration rate, details of leachant circulation and/or collection and removal, permeability of the surrounding materials and nature of the leachant. Climatic conditions can be precipitation, wind, exposure to the sun, to temperature variation and to the atmosphere possibly leading to carbonation, or abiotic oxidation.  $\boxed{A_1}$

NOTE 3 Description of biological conditions can include flora, fauna and micro-organisms  $\boxed{A_1}$ , which can be active in degradation of organic matter, break down of organic contaminants or sulfate oxidation relevant for production of acid rock drainage (ARD). The mineral composition of the waste is very relevant in this context (see 3.3)  $\boxed{A_1}$ .

NOTE 4 Description of the conditions of use of the site at different points in time can include demolition or construction of buildings,  $\boxed{A_1}$  closure and rehabilitation  $\boxed{A_1}$  of disposal sites.

NOTE 5 Description of exceptional conditions can include rising of the ground water table, flooding, fires or earthquakes.