

# SVENSK STANDARD

## SS-EN ISO 21268-1:2019



Fastställt/Approved: 2019-10-22  
Utgåva/Edition: 1  
Språk/Language: engelska/English  
ICS: 13.080.05

---

**Markundersökningar – Lakningsprocedurer för efterföljande kemisk och ekotoxikologisk provning av jord och jordmaterial – Del 1: Satsvis laktest med 2 liter vätska per kilogram torrs substans (ISO 21268-1:2019)**

**Soil quality – Leaching procedures for subsequent chemical and ecotoxicological testing of soil and soil-like materials – Part 1: Batch test using a liquid to solid ratio of 2 l/kg dry matter (ISO 21268-1:2019)**

This preview is downloaded from [www.sis.se](http://www.sis.se). Buy the entire standard via <https://www.sis.se/std-80017672>

# Standarder får världen att fungera

*SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.*

## Delta och påverka

Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

## Ta del av det färdiga arbetet

Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standardpaket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

## Utveckla din kompetens och lyckas bättre i ditt arbete

Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

**Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på [www.sis.se](http://www.sis.se) eller ta kontakt med oss på tel 08-555 523 00.**



# Standards make the world go round

*SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.*

## Take part and have influence

As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

## Get to know the finished work

We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

## Increase understanding and improve perception

With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

**If you want to know more about SIS, or how standards can streamline your organisation, please visit [www.sis.se](http://www.sis.se) or contact us on phone +46 (0)8-555 523 00**



Europastandarden EN ISO 21268-1:2019 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 21268-1:2019.

The European Standard EN ISO 21268-1:2019 has the status of a Swedish Standard. This document contains the official version of EN ISO 21268-1:2019.

© Copyright/Upphovsrätten till denna produkt tillhör SIS, Swedish Standards Institute, Stockholm, Sverige. Användningen av denna produkt regleras av slutanvändarlicensen som återfinns i denna produkt, se standardens sista sidor.

© Copyright SIS, Swedish Standards Institute, Stockholm, Sweden. All rights reserved. The use of this product is governed by the end-user licence for this product. You will find the licence in the end of this document.

*Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS som även lämnar allmänna upplysningar om svensk och utländsk standard.*

*Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS, who can also provide general information about Swedish and foreign standards.*

Denna standard är framtagen av kommittén för Karaktärisering av avfall, mark och slam, SIS/TK 535.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på [www.sis.se](https://www.sis.se) - där hittar du mer information.



EUROPEAN STANDARD

EN ISO 21268-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2019

ICS 13.080.05

Supersedes CEN ISO/TS 21268-1:2009

English Version

Soil quality - Leaching procedures for subsequent chemical and ecotoxicological testing of soil and soil-like materials - Part 1: Batch test using a liquid to solid ratio of 2 l/kg dry matter (ISO 21268-1:2019)

Qualité du sol - Modes opératoires de lixiviation en vue d'essais chimiques et écotoxicologiques ultérieurs des sols et matériaux analogues au sol - Partie 1: Essai en bûchée avec un rapport liquide/solide de 2 l/kg de matière sèche (ISO 21268-1:2019)

Bodenbeschaffenheit - Elutionsverfahren für die anschließende chemische und ökotoxikologische Untersuchung von Boden und von Bodenmaterialien - Teil 1: Schüttelverfahren mit einem Flüssigkeits/Feststoffverhältnis von 2 l/kg Trockenmasse (ISO 21268-1:2019)

This European Standard was approved by CEN on 1 September 2019.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

<b>Contents</b>	Page
<b>European foreword</b> .....	<b>vii</b>
<b>Introduction</b> .....	<b>viii</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Principle</b> .....	<b>3</b>
<b>5 Reagents</b> .....	<b>3</b>
<b>6 Apparatus</b> .....	<b>4</b>
<b>7 Sample pretreatment</b> .....	<b>5</b>
7.1 Preparation of laboratory sample and specification of particle size.....	5
7.2 Preparation of test sample.....	6
7.3 Determination of dry matter content and water content.....	6
7.4 Preparation of the test portion.....	6
<b>8 Procedure</b> .....	<b>7</b>
8.1 Temperature .....	7
8.2 Description of the procedure.....	7
8.2.1 Preparation of the eluent.....	7
8.2.2 Leaching step .....	7
8.2.3 Liquid/Solid separation step .....	8
8.3 Further preparation of the eluate for analysis.....	9
8.4 Blank test for the application of the leaching procedure .....	9
<b>9 Calculation</b> .....	<b>9</b>
<b>10 Test report</b> .....	<b>10</b>
<b>11 Analytical determination</b> .....	<b>10</b>
11.1 General .....	10
11.2 Blank test information.....	11
<b>12 Performance characteristics</b> .....	<b>11</b>
12.1 General .....	11
12.2 Validation results obtained for DIN 19529.....	11
12.2.1 General.....	11
12.2.2 Results for test material containing inorganic substances .....	11
12.2.3 Results for test materials containing organic substances .....	12
<b>Annex A (informative) Information on the influence on the test results of the parameters that affect leaching</b> .....	<b>20</b>
<b>Annex B (informative) Example of a specific liquid-solid separation procedure for soil samples (applying only to the leaching of inorganic substances)</b> .....	<b>23</b>
<b>Annex C (informative) Calculation of centrifugation duration depending on centrifugation speed and rotor dimensions</b> .....	<b>25</b>
<b>Bibliography</b> .....	<b>27</b>

## European foreword

This document (EN ISO 21268-1:2019) has been prepared by Technical Committee ISO/TC 190 "Soil quality" in collaboration with 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 April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

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 ISO/TS 21268-1:2009.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO 21268-1:2019 has been approved by CEN as EN ISO 21268-1:2019 without any modification.

## Introduction

In various countries, tests have been developed to characterize and assess the substances which can be released from materials. The release of soluble substances upon contact with water is regarded as a main mechanism of release, which results in a potential risk to the environment during the use or disposal of materials. The intent of these tests is to identify the leaching properties of materials. The complexity of the leaching process makes simplifications necessary<sup>[1]</sup>.

Not all of the relevant aspects of leaching behaviour can be addressed in one standard (see description of influencing factors in [Annex A](#)).

Tests to characterize the behaviour of materials can generally be divided into three categories addressed in ISO 18772<sup>[2]</sup> and EN 12920<sup>[3]</sup>. The relationships between these tests are summarized below.

- a) “Basic characterization” tests are used to obtain information on the short- and long-term leaching behaviour and characteristic properties of materials. Liquid/solid ratios (L/S), leachant composition, factors controlling leachability, such as pH, redox potential, complexing capacity, role of dissolved organic carbon (DOC), ageing of material and physical parameters, are addressed in these defined tests.
- b) “Compliance” tests are used to determine whether the material complies with a specific behaviour or with specific reference values. These tests focus on key variables and leaching behaviour previously identified by basic characterisation tests.
- c) “On-site verification” tests are used as a rapid check to confirm that the material is the same as that which has been subjected to the compliance test(s). On-site verification tests are not necessarily leaching tests.

The test procedure described in this method belongs to category b): compliance tests.

This document was originally elaborated on the basis of EN 12457-1:2004<sup>[4]</sup>. Especially, modifications considering requirements on subsequent ecotoxicological testing and analysis of organic substances have been included. Validation results have been adopted from DIN 19529<sup>[5]</sup>.



# Soil quality — Leaching procedures for subsequent chemical and ecotoxicological testing of soil and soil-like materials —

## Part 1:

## Batch test using a liquid to solid ratio of 2 l/kg dry matter

### 1 Scope

This document specifies a test providing information on leaching of soil and soil-like materials under the experimental conditions specified hereafter, and particularly at a liquid to solid ratio of 2 l/kg dry matter.

The document has been developed to measure the release of inorganic and organic substances from soil and soil-like material as well as to produce eluates for subsequent ecotoxicological testing. For ecotoxicological testing, see ISO 15799[6] and ISO 17616[7].

NOTE 1 Volatile organic substances include the low-molecular-weight substances in mixtures such as mineral oil.

NOTE 2 It is not always possible to optimise test conditions simultaneously for inorganic and organic substances and optimum test conditions can 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.

NOTE 3 Within the category of organic substances, a significant difference in behaviour exists between the more polar, relatively water-soluble compounds and apolar, hydrophobic organic substances (HOCs). In the latter case, mechanisms of release (e.g. particle-bound or dissolved organic carbon-bound) can be more crucial as well as sorption losses of soluble HOCs on different materials with which they come in contact (e.g. bottles, filters). The test and the results should be used for leaching of organic substances only with thorough consideration of the specific properties of the substances in question and the associated potential problems.

NOTE 4 For ecotoxicological testing, eluates representing the release of both inorganic and organic substances are needed. In this document, ecotoxicological testing is also meant to include genotoxicological testing.

This test method produces eluates, which can subsequently be characterized by physical, chemical and ecotoxicological methods in accordance with existing standard methods. The test is not suitable for substances that are volatile under ambient conditions.

This procedure is not applicable to materials with a dry-matter-content ratio lower than 33 %.

This test is mainly aimed at being used for routine and control purposes, and it cannot be used alone to describe all leaching properties of a soil. Additional leaching tests are needed for that extended goal. This document does not address issues related to health and safety. It only determines the leaching properties as outlined in [Clause 4](#).

### 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.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

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

## SS-EN ISO 21268-1:2019 (E)

ISO 7027-1, *Water quality -- Determination of turbidity — Part 1: Quantitative methods*

ISO 10523, *Water quality — Determination of pH*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 leaching test

test during which a material is put into contact with a *leachant* (3.2) under strictly defined conditions and some substances of the material are extracted

#### 3.2 leachant

liquid used in a *leaching test* (3.1)

Note 1 to entry: For the purpose of this document, the leachant is specified in 5.1.

#### 3.3 eluate

solution recovered from a *leaching test* (3.1)

Note 1 to entry: Eluate is also referred to as leachate.

#### 3.4 liquid to solid ratio

L/S

ratio between the total volume of liquid (L in litres), which in this extraction is in contact with the soil sample, and the dry mass of the sample (S in kg of dry matter)

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

#### 3.5 dry matter content

$w_{dm}$

ratio, expressed in percent, between the mass of the dry residue, determined in accordance with ISO 11465, and the corresponding raw mass

#### 3.6 water content

$w_{H_2O}$

ratio, expressed in percent, between the mass of water contained in the material as received and the corresponding dry residue of the material

Note 1 to entry: The basis for the calculation of the water content is the mass of the dry residue in this document, as specified in ISO 11465 (for the determination of the water content of soil).

#### 3.7 laboratory sample

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

### 3.8

#### test sample

sample, prepared from the *laboratory sample* (3.7), from which *test portions* (3.9) are removed for testing or analysis

### 3.9

#### test portion

quantity of material of appropriate size for measurement of the concentration or other properties of interest taken from the *test sample* (3.8)

Note 1 to entry: The test portion can be taken from the *laboratory sample* (3.7) directly if no pre-treatment of the sample is required, but usually it is taken from the test sample.

Note 2 to entry: A unit or increment of proper homogeneity, size and fineness, needing no further preparation, can be a test portion.

### 3.10

#### soil-like material

excavated soil, dredged materials, manufactured soils, treated soils and fill materials

## 4 Principle

The test portion, which originally or after suitable pre-treatment has a particle size less than or equal to 2 mm, is brought into contact with water containing a low concentration (0,001 mol/l) of calcium chloride or demineralised water (5.1) under defined conditions. The standard method is based on the assumption that equilibrium or near-equilibrium is achieved between the liquid and solid phases during the test period. The solid residue is subsequently separated from the liquid. The separation procedure may strongly influence the test results and shall be particularly stringent for organic substances. The properties of the eluate are measured using methods developed for water analysis adapted to meet criteria for analysis of eluates, and the eluate may be subjected to subsequent ecotoxicological testing.

After the test, the leaching conditions imposed by the material, in terms of pH, electrical conductivity and, optionally, DOC, redox potential or turbidity, shall be recorded.

NOTE 1 These parameters often control the leaching behaviour of soil and soil-like materials and are therefore important for evaluation of the test results. DOC, in particular, is crucial in soil and soil-like materials for many inorganic and organic substances.

NOTE 2 The leachant is 0,001 mol/l CaCl<sub>2</sub> to minimize the mobilisation of DOC caused by an ionic strength of the leachant which is too low.

The procedure described in this document is based on the more stringent test requirements for determining the release of organic substances and for subsequent ecotoxicological testing. If only the release of inorganic substances is to be measured, less stringent requirements may be adopted for some steps of the procedure.

## 5 Reagents

**5.1 Demineralised water or deionised water or water of equivalent purity** (5 < pH < 7,5) with a conductivity of <0,5 mS/m in accordance with grade 3 specified in ISO 3696 made to **0,001 mol/l CaCl<sub>2</sub>**.

**5.2 Calcium chloride (CaCl<sub>2</sub> · 2 H<sub>2</sub>O)**, analytical grade.

**5.3 Sodium azide (NaN<sub>3</sub>)**, analytical grade.

**5.4 Nitric acid (HNO<sub>3</sub>)**, analytical grade, made to 0,1 mol/l rinsing solution.

**5.5 Organic solvent (acetone, analytical grade) for rinsing and cleaning.**