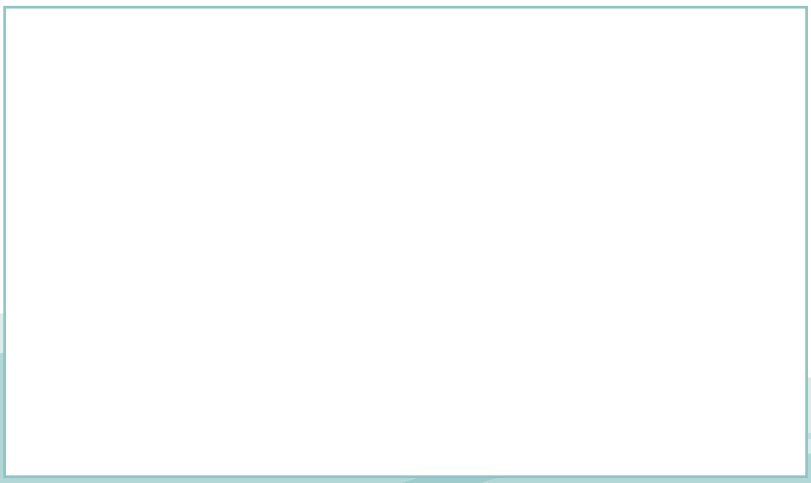
SVENSK STANDARD
SS-EN ISO 11269-1:2012

Fastställd/Approved: 2012-12-17
Publicerad/Published: 2012-12-21
Utgåva/Edition: 1
Språk/Language: engelska/English
ICS: 13.080.30

Markundersökningar – Bestämning av föroreningars effekt på markfloran –
Del 1: Metod för bestämning av tillväxthämning hos rötter (ISO 11269-1:2012)

Soil quality – Determination of the effects of pollutants on soil flora –
Part 1: Method for the measurement of inhibition of root growth (ISO 11269-1:2012)



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Europastandarden EN ISO 11269-1:2012 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 11269-1:2012.

Denna standard ersätter SS-ISO 11269-1, utgåva 1.

The European Standard EN ISO 11269-1:2012 has the status of a Swedish Standard. This document contains the official version of EN ISO 11269-1:2012.

This standard supersedes the Swedish Standard SS-ISO 11269-1, edition 1.

Förhållandet till övriga delar under samma huvudtitel - Utdrag ur Förord i ISO 11269-1:2012/ Relations to other parts under the same general title - Extract from the Foreword of ISO 11269-1:2012

ISO 11269 consists of the following parts, under the general title *Soil quality — Determination of the effects ofpollutants on soil flora*:

- *Part 1: Method for the measurement of inhibition of root growth*
- *Part 2: Effects of contaminated soil on the emergence and early growth of higher plants*

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB 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 Förlag AB, 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 - där hittar du mer information.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11269-1

December 2012

ICS 13.080.30

English Version

Soil quality - Determination of the effects of pollutants on soil flora - Part 1: Method for the measurement of inhibition of root growth (ISO 11269-1:2012)

Qualité du sol - Détermination des effets des polluants sur la flore du sol - Partie 1: Méthode de mesurage de l'inhibition de la croissance des racines (ISO 11269-1:2012)

Bodenbeschaffenheit - Bestimmung der Wirkungen von Schadstoffen auf die Bodenflora - Teil 1: Verfahren zur Messung der Wurzelwachstumshemmmung (ISO 11269-1:2012)

This European Standard was approved by CEN on 11 November 2012.

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN ISO 11269-1:2012: E

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Foreword

The text of ISO 11269-1:2012 has been prepared by Technical Committee ISO/TC 190 “Soil quality” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 11269-1:2012 by Technical Committee CEN/TC 345 “Characterization of soils” 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 June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.

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.

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Endorsement notice

The text of ISO 11269-1:2012 has been approved by CEN as a EN ISO 11269-1:2012 without any modification.

Introduction

Chemical analysis of soil samples or waste materials to be disposed on soil, together with ecotoxicological testing, provides substantial evidence of the suitability of the soil for arable production, or gives information on the potential environmental risk resulting from the disposal of wastes such as sewage sludge on farmland. There is also a need to assess the quality of the soil after reclamation of industrial sites and colliery tips or when capping landfill sites. As the ability of the soil to grow crops is the main criterion, a rapid-growth test has been developed, based on seedling growth in controlled environmental conditions.

Two major prerequisites of a phytotoxicity test are that it provides consistently reliable results and that it can be used at any time of the year. It is therefore essential that seeds be grown in a controlled environment to ensure optimal growing conditions which can be maintained for any number of tests, producing reproducible results over a long period of time.

The test method described in this part of ISO 11269 can be used to compare soils, to monitor changes in their activity or to determine the effect of added chemicals or materials (compost, sludge, waste).

Soil quality — Determination of the effects of pollutants on soil flora —

Part 1:
Method for the measurement of inhibition of root growth

1 Scope

This part of ISO 11269 describes a method for the determination of the effects of contaminated soils or contaminated samples on the root elongation of terrestrial plants.

This method is applicable to soils, soil materials, compost, sludge, waste or chemical testing. It is applicable to the comparison of soils of known and unknown quality and to the measurement of effects of materials (compost, sludge, waste) or chemicals deliberately added to the soil.

The method is not intended to be used as a measure of the ability of the soil to support sustained plant growth.

2 Normative references

The following referenced documents are indispensable for the application 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 10381-6, *Soil quality — Sampling — Part 6: Guidance on the collection, handling and storage of soil under aerobic conditions for the assessment of microbiological processes, biomass and diversity in the laboratory*

ISO 10390, *Soil quality — Determination of pH*

ISO 10694, *Soil quality — Determination of organic and total carbon after dry combustion (elementary analysis)*

ISO 10930, *Soil quality — Measurement of the stability of soil aggregates subjected to the action of water*

ISO 11260, *Soil Quality — Determination of effective cation exchange capacity and base saturation level using barium chloride solution*

ISO 11268-1, *Soil quality — Effects of pollutants on earthworms — Part 1: Determination of acute toxicity to Eisenia fetida/Eisenia andrei*

ISO 11268-2, *Soil quality — Effects of pollutants on earthworms — Part 2: Determination of effects on reproduction to Eisenia fetida/Eisenia andrei*

ISO 11277, *Soil quality — Determination of particle size distribution in mineral soil material — Method by sieving and sedimentation*

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

ISO/TS 20281, *Water quality — Guidance on statistical interpretation of ecotoxicity data*

3 Terms and definitions

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

3.1
contaminant
substance or agent present in the soil as a result of human activity

3.2
test mixture
mixture of test soil or test material (compost, sludge, waste or chemical) with control soil

3.3
radicle
portion of the plant embryo which develops into the primary root

3.4
hypocotyl
portion of the axis of an embryo or seedling situated between the cotyledons (seed leaves) and the radicle

3.5
reference soil
uncontaminated site-specific soil (e.g. collected in the vicinity of a contaminated site) with similar properties (nutrient concentrations, pH, organic carbon content and texture) as the test soil

3.6
standard soil
field-collected soil or artificial soil whose main properties (e.g. pH, texture, organic matter content) are within a known range

EXAMPLE Euro-soils[1], artificial soil[2], LUFA soil.[1)]

NOTE The properties of standard soils can differ from the test soil.

3.7
control soil
reference or standard soil used as a control and as a medium for preparing dilution series with test soil or test material (e.g. compost, sludge, waste, chemical)

NOTE Both the effective concentration (EC_x) and the no-observed-effect concentration (NOEC) are expressed in milligrams of test substance per kilogram (dry mass) of the test substrate. Soil mixtures are given in percent based on soil dry mass.

3.8
effective concentration
EC_x
effective concentration (dilution) of the test soil or test material (e.g. compost, sludge, waste, chemical) at which root elongation is reduced by x % compared to the control

4 Principle

This method compares the root elongation of terrestrial plants in a test soil and/or a series of dilutions with a control soil. This method may also be used for the testing of compost, sludge, waste or chemicals by applying various concentrations of the material under investigation to a control soil.

Pregerminated seeds are exposed to the test material under controlled conditions. After the growth period, the lengths of the roots of the test plants are compared with those of the control plants. Statistically significant differences in the root lengths of seedlings grown in any test medium compared to the controls are indicative of an effect.

NOTE Shoot height is also a useful parameter, and this can be measured in conjunction with root length to provide additional or corroborative data.

1) Euro-soils, artificial soil and LUFA soil are examples of suitable products available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products.

5 Test plants

Winter barley (*Hordeum vulgare* L.), oat (*Avena sativa* L.) and wheat (*Triticum aestivum* L.) are the recommended species. Other monocotyledonous plant species might be selected, e.g. plants with ecological or economic significance in certain regions of the world, provided that the roots of these plants grow unhindered in sand and in control soil under the conditions specified. Only plants that tolerate the properties of the test soils and test conditions (besides their chemical contamination) should be selected. For example, a species sensitive to low pH values should not be used for testing forest soils with low pH-values.

Seeds coated with insecticides and/or fungicides should not be used.

NOTE The methodology of this test can also be adapted for use with dicotyledonous species with straight roots, which are easily measurable.

6 Materials

6.1 Test vessels

The test vessels shall be cylindrical, at least 8 cm in diameter and 11 cm in height, and shall have parallel sides to ensure that the roots of seedlings are not restricted and do not encounter tapering side walls. The base of the pots shall be perforated and covered with filter paper.

NOTE When filled to a height of 10 cm, the pots contain approximately 500 g of sand, 400 g of air-dried soil and 250 g of artificial soil.

6.2 Soil

6.2.1 Test soil

Some physical characteristics of the test soil can induce disturbances in root elongation such as heterogeneous soil with big particles or clayey soil with a high water content. Therefore, the soil to be tested shall be passed through a sieve with a 2 mm square mesh to remove coarse fragments. Furthermore, fine particles (<20 µm according to ISO 11277) should not exceed 20 % of the dry mass.

Before the test, the soil is stored in accordance with ISO 10381-6.

For each soil, the following characteristics should be determined:

a) soil texture classification;

b) pH (KCl) in accordance with ISO 10390;

c) water content in accordance with ISO 11465;

d) water-holding capacity in accordance with Annex A;

e) cationic exchange capacity in accordance with ISO 11260;

f) organic matter content in accordance with ISO 10694.

6.2.2 Control soil

Either reference or standard soils may be used as the control soil.

When comparing the root elongation in soils of known and unknown quality, the control soil and soil under test should be of the same textural class, and be as similar as practicable in all respects other than the presence of the chemical or contaminant. Indeed, significant differences in soil characteristics other than the presence of contaminant may lead to differences in root lengths and may induce false positive test results.