



SLOVENSKI STANDARD

SIST EN 14984:2017

01-april-2017

Nadomešča:
SIST EN 14984:2006

Sredstva za apnjenje - Določevanje vpliva sredstva za apnjenje na pH tal - Inkubacijska metoda

Liming materials - Determination of product effect on soil pH - Soil incubation method

Kalkdünger - Bestimmung des Produkteinflusses auf den Boden-pH-Wert - Bodeninkubationsverfahren

Amendements minéraux basiques - Détermination de l'effet d'un produit sur le pH d'un sol - Méthode par incubation du sol [SIST EN 14984:2017](https://standards.iteh.ai/catalog/standards/sist/7e0175a8-e419-4db8-98fa-15e1d8e41f71/sist-en-14984-2017)

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65.080

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14984

July 2016

ICS 65.080

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English Version

**Liming materials - Determination of product effect on soil
pH - Soil incubation method**

Amendements minéraux basiques - Détermination de
l'effet d'un produit sur le pH d'un sol - Méthode par
incubation du sol

Kalkdünger - Bestimmung des Produkteinflusses auf
den Boden-pH-Wert - Bodeninkubationsverfahren

This European Standard was approved by CEN on 19 May 2016.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EN 14984:2016 (E)**European foreword**

This document (EN 14984:2016) has been prepared by Technical Committee CEN/TC 260 “Fertilizers and liming materials”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by January 2017.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 EN 14984:2006.

The following changes have been made to the former edition:

- a) effective neutralizing value by incubation (*ENVI*) added as alternative way for the expression of results;
- b) Formula for calculation of *ENVI* for method A added;
- c) Formula for calculation of *ENVI* for method B added;
- d) editorially revised.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The chemical methods for determining the neutralizing value (NV) (see EN 12945) and the reactivity (see EN 13971 and EN 16357) of liming materials are not always appropriate indicators for any material claimed to have a liming effect in the soil, particularly materials with a high organic matter content.

The biological mineralization of organic matter contained in some products can, in the field, have an effect on pH, which cannot be quantified by the chemical methods.

The two methods described in this document overcome these problems.

Both methods characterize products through their effect on the pH of a soil under controlled, standard conditions, and establish the efficiency of products when applied to a standard soil.

Method A specifies a reference soil with tight characteristics with respect to pH range before incubation, cation exchange capacity (CEC), mass fraction of organic carbon, and mass fraction of particles finer than 0,002 mm (clay).

Method B can apply the same reference soil as Method A, but also allows alternative standard soils with a wider content of particles finer than 0,002 mm (clay), and a wider range of mass fraction of organic matter. Clay and organic matter are the decisive reactants to a liming material

However, attention is drawn to the limitations of these methods. They are laboratory methods carried out under controlled conditions and care should be taken when applying the results to field conditions. The quality of incorporation of the liming material into the soil and the eventual need to break down the product agglomerates, together with the soil and climate conditions, can affect the results. Nevertheless, these methods allow a comparison of the potential neutralizing effect of liming products under optimum and reproducible conditions.

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EN 14984:2016 (E)

1 Scope

This document specifies two methods (method A and method B) of measuring the effect of the addition of any material claimed to have a liming effect on the soil, using the same basic principles.

Method A measures the changes to the soil pH resulting from the addition of any material claimed to have a liming effect on a standard soil, measured over a period of one month.

Method B assesses the efficiency of any material claimed to have a liming effect, using a range of defined soils and measured over a period of up to 2,5 years.

The methods are not applicable to mineral products coarser than 6,3 mm for method A or 20 mm for method B, determined according to EN 12948.

NOTE These methods allow comparison of products under controlled climatic conditions but do not replace field experiments.

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 1482-1, *Fertilizers and liming materials - Sampling and sample preparation - Part 1: Sampling*

EN 1482-3, *Fertilizers and liming materials — Sampling and sample preparation — Part 3: Sampling of static heaps*

EN 12048, *Solid fertilizers and liming materials - Determination of moisture content - Gravimetric method by drying at (105 +/- 2)°C (ISO 8190:1992 modified)* EN 14984:2017

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EN 12049, *Solid fertilizers and liming materials - Determination of moisture content - Gravimetric method by drying under reduced pressure (ISO 8189:1992 modified)*

EN 12945, *Liming materials - Determination of neutralizing value - Titrimetric methods*

EN 12948, *Liming materials - Determination of size distribution by dry and wet sieving*

EN 13040, *Soil improvers and growing media - Sample preparation for chemical and physical tests, determination of dry matter content, moisture content and laboratory compacted bulk density*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696)*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate*

ISO 10390:2005, *Soil quality — Determination of pH*

ISO 11272, *Soil quality — Determination of dry bulk density*

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 14235, *Soil quality — Determination of organic carbon by sulfochromic oxidation*

NF X31-130, *Soil quality — Chemical methods — Determination of the cationic exchange capacity (CEC) and extractible cations (buffered at pH = 7, Metson method)*¹⁾

3 Terms and definitions

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

3.1

efficiency

ability of a liming material to react in soil or solution within a specified time

Note 1 to entry: In this document, efficiency is calculated as mentioned in 6.5.2.

3.2

internal peak values approach

crediting fine fractions of a product or other highly reactive materials for 100 % efficiency in soil when reaching maximum pH value

Note 1 to entry: This efficiency is maintained even if pH later drops due to soil microbial counteraction (acidification).

Note 2 to entry: For further clarification see Figure 1 and Figure 2.

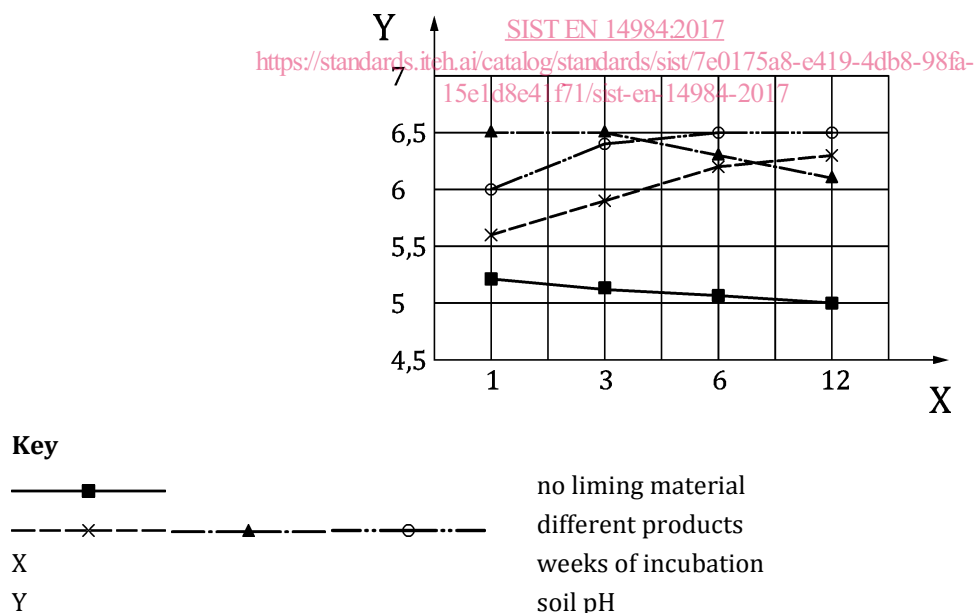


Figure 1 — Soil pH versus weeks of soil incubation

¹⁾ No international buffered method is available at pH = 7. As soon as an International Standard is available for cation exchange capacity buffered at pH = 7, it will replace the NF X 31-130.

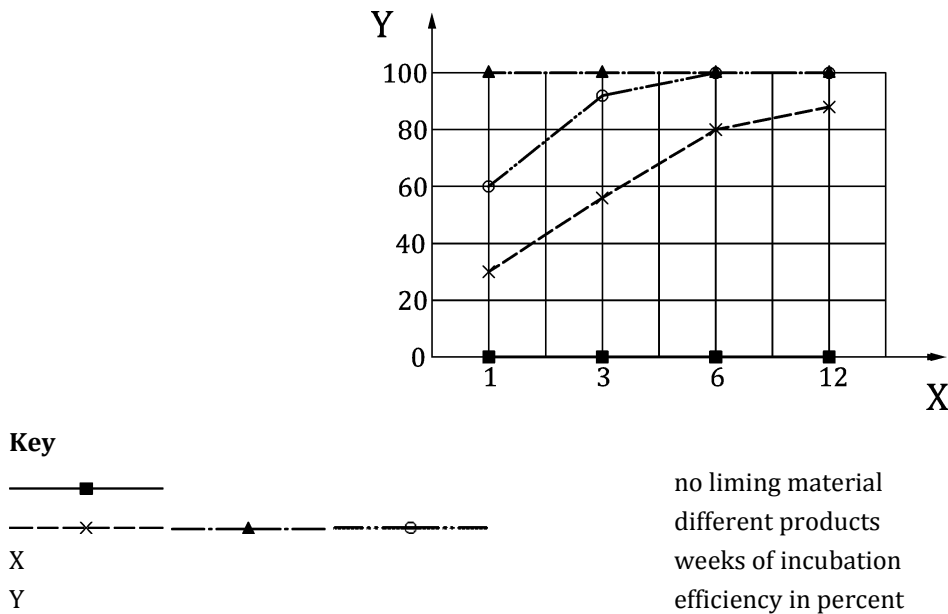


Figure 2 — Efficiency versus weeks of soil incubation

3.3

liming index

ratio of the improvement in soil pH due to the product under test to that achieved using the reference liming material

Note 1 to entry: The liming index, LI_x , is an indicator given by the following $LI_x = \frac{(pH1 - pH2)}{(pH3 - pH4)}$

where

LI is the liming index;

$pH1$ is the pH of the soil with tested product after time x ;

$pH2$ is the pH of the soil alone after time x ;

$pH3$ is the pH of the soil with the reference liming material after time x ;

$pH4$ is the pH of the soil alone after time x ;

x is the length of time of the incubation test. Default value is four weeks.

3.4 effective neutralising value by incubation

ENVI

alternative expression of results, expressed as *NV* equivalent

Note 1 to entry: The effective neutralizing value by incubation, *ENVI*, is an indicator given by the following Formula:

$$ENVI = LI_{4\text{weeks}} \times RLMNV \quad (\text{for method A, see 5.5, Table 2})$$

$$ENVI_{i\text{weeks}} = E_{i\text{weeks}} \times RLMNV / 100 \quad (\text{for method B, see 6.5.2})$$

where

ENVI is the effective neutralizing value by incubation;

*LI*_{4weeks} is the liming index at 4 weeks in method A;

*E*_{*i* weeks} is the efficiency at *i* weeks in method B;

RLMNV is the neutralizing value of the reference liming material (5.1.2);

if the conventional *NV* unit is CaO, *RLMNV* = 75,6

if the conventional *NV* unit is HO-, *RLMNV* = 45,8.

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4 Principle

4.1 General

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Incorporation of a standardized amount of liming material or material claimed to have a liming effect into a reference soil or range of defined soils. Incubation of these soils under controlled climatic conditions for a defined period. Checking the buffer capacity of the soil with a reference liming material and measuring the changes in soil pH.

4.2 Method A

Monitoring after 24 h, 2 weeks and 4 weeks the changes in soil pH under controlled temperature and moisture conditions.

4.3 Method B

Monitoring after 24 h, 1 week, 3 weeks, 6 weeks, 12 weeks, 24 weeks and 48 weeks, and 1 year, 1,5 years, 2 years and 2,5 years of the changes in soil pH under controlled temperature and moisture conditions. When testing calcined products (burnt products and slaked products), add monitoring at 1 h, 3 h and 6 h and 3 days. The test may be stopped at any time after 3 weeks, according to information required.

The tests should be performed within the pH range of 4,6 to 7,0, subject to there being a linearity response.

EN 14984:2016 (E)**5 Method A****5.1 Reagents and materials****5.1.1 Reference soil,**

with the following characteristics:

- a) pH 5,6 to pH 6,4 in water, when determined in settling suspension after 16 h in accordance with ISO 10390:2005, 7.1.3, 7.2 and 7.3;
- b) cation exchange capacity of 9 cmol+/kg to 11 cmol+/kg, when determined in accordance with NF X 31-130 (see footnote in Clause 2);
- c) mass fraction of organic carbon (OC) of 0,50 % to 2,00 % on a dry basis, when determined in accordance with ISO 14235 (this is equivalent to 0,86 % to 3,44 % expressed as organic matter, (OM) (OM = OC × 1,72));
- d) mass fraction of particles of equivalent spherical diameter less than 0,002 mm (clay) shall be less than 20 %, when determined in accordance with ISO 11277.

5.1.2 Reference liming material (RLM),

calcium hydroxide of recognized analytical grade.

5.1.3 Water,

conforming to EN ISO 3696, grade 3.

5.2 Apparatus

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5.2.1 Temperature-controlled room,

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capable of being maintained at (20 ± 2) °C.

5.2.2 pH meter,

capable of being read to the nearest 0,01 unit.

5.2.3 Beakers,

capacity 200 ml.

5.2.4 Pots,

of inert material with respect to soil, 50 mm to 200 mm diameter, capacity according to Table 1.

5.2.5 Volumetric spoons,

capacity 20 ml.

5.2.6 Magnetic stirrer**5.2.7 Balance,**

with an accuracy of ± 1 g.

5.2.8 Precision balance,

with an accuracy of ± 1 mg.