BS EN 13037:2011

BSI Standards Publication

Soil improvers and growing media — Determination of pH

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee AW/20, Top soil and other growing media.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Soil improvers and growing media - Determination of pH

Amendements du sol et supports de culture - Détermination du pH

Bodenverbesserungsmittel und Kultursubstrate - Bestimmung des pH-Wertes

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Foreword

This document (EN 13037:2011) has been prepared by Technical Committee CEN/TC 223 “Soil improvers and growing media”, the secretariat of which is held by ASI.

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of an identical text or by endorsement, at the latest by May 2012, and conflicting national standards shall be withdrawn at the latest by May 2012.

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.

This document supersedes EN 13037:1999.

The main change to the previous edition is the change of the scope.

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

1 Scope

This European Standard specifies an instrumental method for the routine determination of pH in a suspension of soil improvers or growing media.

This method is not applicable to liming materials and preformed materials such as mineral wool slabs and foam slabs.

NOTE The requirements of the standard may differ from the national legal requirements for the declaration of the products concerned.

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.

EN 13040:2007, *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 3696:1987)*

ISO 1770, *Solid-stem general purpose thermometers*

3 Terms and definitions

For the purposes of this document the terms and definitions given in EN 13040:2007 apply.

4 Principle

A sample is extracted with water at (22 ± 3,0) °C in an extraction ratio of 1 : 5 (1 V sample + 5 V water). The pH of the suspension is measured using a pH meter.

5 Reagents

Use only reagents of recognized analytical grade.

5.1 Water with a specific conductivity not higher than 0,2 mS/m at 25 °C and a pH > 5,6 (grade 2 water according to EN ISO 3696).

5.2 Buffer solution, pH = 4,00 at 20 °C

Dissolve 10,21 g of potassium hydrogen phthalate ($C_8H_5KO_4$) in water (see 5.1) and dilute to 1000 ml in a volumetric flask.

5.3 Buffer solution, pH = 7,00 at 20 °C

Dissolve 3,800 g of potassium dihydrogen phosphate (KH_2PO_4) and 3,415 g disodium hydrogen phosphate (Na_2HPO_4) in water (see 5.1) and dilute to 1000 ml in a volumetric flask.

The potassium dihydrogen phosphate shall be dried before use for 2 h at 110 °C to 120 °C.

5.4 Buffer solution, pH = 9,22 at 20 °C

Dissolve 3,800 g of disodium tetraborate decahydrate ($Na_2B_4O_7 \cdot 10H_2O$) in water (see 5.1) and dilute to 1000 ml in a volumetric flask.

Commercially available buffers (e.g. in the form of tablets) covering the required pH range according to the manual of the pH-meter may also be used.

NOTE 1 The buffer solutions (see 5.2, 5.3 and 5.4) are stable for one month if stored in polyethylene bottles in a refrigerator.

NOTE 2 If disodium tetraborate is stored for a long time there is the possibility of loss of water of crystallisation.

6 Apparatus

Usual laboratory apparatus and in particular the following apparatus according to 6.1 to 6.6.

6.1 pH-meter, with slope adjustment and temperature control.

6.2 Analytical balance, with a scale interval of 0,01 g.

6.3 Glass electrode and a reference electrode or a combined electrode of equivalent performance.

In the case of extreme pH values (greater than 10) an electrode specifically designed for that range shall be used.

NOTE The use of electrodes in systems containing soil increases the danger of contamination leading to deterioration of performance.

6.4 Thermometer, capable of measuring to the nearest 1 °C, conforming to type C of ISO 1770.

6.5 Plastic or glass containers of sufficient capacity to accommodate the volume of the sample, extractant and 10 % air volume.

6.6 Shaking or mixing machine, capable of holding container (see 6.5) and maintaining the sample in suspension without damaging the structure of the sample.

7 Preparation

7.1 Extraction

7.1.1 General

Prepare the sample in accordance with EN 13040 and determine the compacted laboratory bulk density of the sample in accordance with Annex A of EN 13040:2007.

7.1.2 Test samples passing through a 20 mm sieve

Take a weight equivalent to 60 ml of the sample volume to the nearest 1 g and transfer to the container (see 6.5). Add 300 ml of water (see 5.1), secure the cap and shake for 1 h on the shaking machine (see 6.6) at (22 ± 3) °C.

7.1.3 Test samples passing through a 40 mm sieve

Take a weight equivalent to 250 ml of the sample volume to the nearest 1 g and transfer to the container (see 6.5). Add 1250 ml of water (see 5.1), secure the cap and shake for 1 h on the shaking machine (see 6.6) at (22 ± 3) °C.

8 Procedure

8.1 Calibration of the pH meter

Calibrate the pH-meter as prescribed in the manufacturer's manual, using at least two buffer solutions appropriate to the pH of the sample under test.

NOTE With electrodes that are in good condition, equilibrium is normally achieved within 30 s.

8.2 Measurement of the pH

Adjust the pH-meter as indicated in the manufacturer′s manual. Measure the temperature of the suspension taking care to ensure that the temperature of the buffer solutions and the sample suspensions do not differ by more than 1 °C. Agitate the suspension thoroughly just before the measurement and measure the pH in the settling suspension. Read the pH after stabilisation is reached, i.e. when the reading does not change by more than 0,1 of a pH unit over 15 s. Note the values to 1 decimal place.

9 Precision

The repeatability and reproducibility of the pH in separately prepared samples should be in accordance with Table A.1.

A summary of the results of an interlaboratory trial to determine the precision of the method in accordance with ISO 5725 are given in Annex A.

NOTE The values derived from the interlaboratory trial may not be applicable to concentrations and matrices other than those given.

10 Test report

The test report shall contain the following information:

a) a reference to this European Standard;

b) all information necessary for complete identification of the sample;

c) the results of the determination expressed to the nearest 0,1 pH-unit;

d) details of any operations not specified in the European Standard or regarded as optional, as well as any factor which may have affected the results;

e) the laboratory compacted bulk density.

Annex A
(informative)

Results of an interlaboratory trial to determine pH

An interlaboratory trial was organized in 1995 under the auspices of the European Committee for Standardization, to test the procedures specified in this European Standard.

In this trial the number of laboratories given in Table A.1 determined the pH in three types of samples.

Table A.1 — Summary of the results of an interlaboratory trial for the determination of pH

Sample	Unfertilized peat perlite	Composted coarse bark	Composted straw and domestic sewage
Number of laboratories retained after eliminating outliers	16	16	16
Number of outliers (laboratories)	0	0	0
Mean Value (pH units)	5,34	6,43	6,71
Repeatability standard deviation, s_r (pH units)	0,04	0,06	0,03
Repeatability relative standard deviation (%)	0,75	0,93	0,44
Repeatability limit, r = 2,8 s_r (pH units)	0,12	0,18	0,09
Reproducibility standard deviation, s_R (pH units)	0,17	0,35	0,16
Reproducibility relative standard deviation (%)	3,18	5,44	2,38
Reproducibility limit, R = 2,8 s_R (pH units)	0,48	0,99	0,46

Bibliography

ISO 5725 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

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