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Please find enclosed the 1st working draft on the revision of EN 13037. As agreed during the last meeting of CEN/TC 223/WG 4, this version is circulated to CEN/TC 223 as first working draft.

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Soil improvers and growing media — Determination of pH

Bodenverbesserungsmittel und Kultursubstrate — Bestimmung des pH-Wertes

Amendements du sol et supports de culture — Détermination du pH

ICS:

CCMC will prepare and attach the official title page.

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European foreword

This document (prEN 13037:2021) has been prepared by Technical Committee CEN/TC 223"Soil improvers and growing media", the secretariat of which is held by NEN.

This document is a working document.

This document will supersede EN 13037:2011.

In comparison with the previous edition, the following technical modifications have been made:

- Adaptation of scope and applicability with respect to the EU – Fertilzer Product Regulation

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

SAFETY PRECAUTIONS — Care should be taken when handling samples that may contain sharps or are of a dusty nature.

1 Scope

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

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 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.

EN 13040:—[1], *Soil improvers and growing media — Sample preparation for chemical and physical tests, determination of dry matter content, moisture content and laboratory bulk density*

ISO 1770, *Solid-stem general purpose thermometers*

3 Terms and definitions

For the purposes of this document the terms and definitions given in CEN/TS 00223137:—[2] and EN 13040:— 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.

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.

Commercially available buffers (e.g. in the form of tablets) covering the required pH may also be used.

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 (115 ± 5) °C.

Commercially available buffers (e.g. in the form of tablets) covering the required pH may also be used.

5.1 Buffer solution, known pH between 9 and 9,5 at 20 °C.

[1] Under preparation. Stage at the time of publication: EN 13040:20**.

[2] Under preparation. Stage at the time of publication: prCEN/TS 00223137:20**.

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, giving a pH of 9,22.

Commercially available buffers (e.g., in the form of tablets) covering the required pH range 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

Prepare the sample in accordance with clause 9 of EN 13040:— and determine the laboratory bulk density of the sample in accordance with Annex A of EN 13040:—.

8 Procedure

8.1 Extraction of material in solid form

8.1.1 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.

8.1.2 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 (5.1), secure the cap and shake for 1 h on the shaking machine (6.6) at (22 ± 3) °C.

8.1.3 Test samples > 40 mm

Take a weight equivalent to 250 ml of the sample volume to the nearest 1 g and transfer to a 2000 ml container (6.5). Add 1250 ml of water (5.1), secure the cap and shake for 1 h on the shaking machine (6.6) at (22 ± 3) °C.

8.2 Extraction of material in pre-shaped form

Take a weight equivalent to 150 ml of the sample volume to the nearest 1 g and transfer to a 1000 ml container (6.5). Add 750 ml of water (5.1), secure the cap and shake for 1 h on the shaking machine (6.6) at (22 ± 3) °C.

Before measuring the pH pour out the fluid and the pre-shaped sample in a beaker. Squeeze the pre-shaped sample in the beaker as much as possible by applying a pressure to the sample with help of a plastic masher or pestle.

8.3 Measurement

8.3.1 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 1 With electrodes that are in good condition, equilibrium is normally achieved within 30 s.

NOTE 2 Temperature compensation can be used when measuring the sample.

8.3.2 Measurement of the pH of solid samples

Adjust the pH-meter as indicated in the manufacturer’s manual. 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.

8.3.3 Measurement of the pH of liquid and aqueous pasty samples

The measurement of the pH of liquid samples can be made directly in the sample. For aquaeous pasty samples, follow the procedure as described in 8.3.2.

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 1 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 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

The number of matrices has to be enlarged for the future ring test, including additionally

Material	**Particle size**
1: Green compost	unsieved
2: Perlite, peat	<40 mm
3: Green compost, digestate, peat	< 20 mm
5: Bark	> 40mm
6: Pre-shaped	

Bibliography

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

[2] CEN/TS 00223137:—, *Soil improvers and growing media — Terminology*