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Jordförbättringsmedel och odlingssubstrat – Bestämning av partikelstorleksfördelning

Soil improvers and growing media – Determination of particle size distribution

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Soil improvers and growing media - Determination of particle size distribution

Amendements du sol et supports de culture - Détermination de la répartition granulométrique

Bodenverbesserungsmittel und Kultursubstrate - Bestimmung der Partikelgrößenverteilung

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Foreword

This document (EN 15428:2007) has been prepared by Technical Committee CEN/TC 223 “Soil improvers and growing media”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by March 2008, and conflicting national standards shall be withdrawn at the latest by March 2008.

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1 Scope

This document specifies a method of determination of particle size distribution in soil improvers and growing media.

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 12579, *Soil improvers and growing media - Sampling*

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*

CR 13456:1999, *Soil improvers and growing media — Labelling, specifications and product schedules*

ISO 565, *Test sieves - Metal wire cloth, perforated metal plate and electroformed sheet - Nominal sizes of openings*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CR 13456:1999 and EN 13040:2007 apply.

4 Principle

Sieving an air-dried sample of a growing medium or soil improver with specified test sieves using a mechanical sieving machine and determination of the weight fraction distribution.

5 Apparatus

5.1 Sieving-shaking machine, vertical vibrating movement, with amplitude adjustment, and interval timer. Sieving time: 7 min in periods of 10 s shaking and 1 s rest with an amplitude in the range between 0,5 mm and 1,5 mm.

5.2 Test sieves, diameter 200 mm or 300 mm, rim height 55 mm, aperture sizes as listed in ISO 565, of stainless steel woven wire with square openings 31,5 mm, 16,0 mm, 8,0 mm, 4,0 mm, 2,0 mm, 1,0 mm, and reception tray, sieve lid.

5.3 Drying oven, forced air suction, adjustable to 40 °C ± 5 °C.

NOTE Care should be taken to prevent loss of fine lightweight particles.

5.4 Three drying trays, rim height ca 50 mm ± 10 mm, minimum bottom area of 400 cm^2, heat proof to 50 °C.

5.5 Balance with a weighing range at least 4 kg and an accuracy 0,1 g.

5.6 Apparatus for sample division, comprising any suitable equipment for combining and reducing the samples which preserves the characteristics of the product. Depending on the particle size, material and

particle size distribution, the opening width of the passage should be 2,5 times to 3 times greater than the diameter of the largest particle.

6 Optimization of sieving machine

Prior to its first use the shaking machine shall be optimized as described in Annex A. Optimization shall be repeated annually.

7 Test sample

7.1 General

For the determination of the particle size distribution materials shall be sampled in accordance with EN 12579.

This European Standard is applicable to samples supplied in a form in which they are used and is not necessarily applicable to or suitable for all types of growing medium or soil improver, for example material that is not able to flow when used or is sticky.

Samples shall be analysed in a state ready to be used.

Prepare the test sample in accordance with EN 13040:2007 up to Clause 7**.**

7.2 Determination of the sub-sample volume

First determine the analytical sample size. For fine materials, use a smaller volume than for coarser materials to reduce the risk of blocking the sieves (see Table 1).

Place the 8,0 mm mesh sieve (5.2) on the sieving machine with the reception tray under it. Reduce the sample to the size of the sub-sample using an apparatus for sample division (5.6). Transfer the appropriate sub-sample (750 ml for 300 mm sieve and 375 ml for 200 mm sieve) to the sieve and place the lid on the sieve. Secure to the sieving tower and switch on the sieving machine (5.1) for 1 min at the standard setting. For samples in which the moisture content is too high, first air dry the sample in a drying oven for 16 h (5.3).

NOTE If the moisture content is too high, the sample will not pass through the sieve.

After sieving, weigh the sieve (*c*), the reception tray with the sample (*a*), then dry-clean the sieve and reception tray and weigh them empty (*d* and *b* respectively).

Calculate the fraction according to 10.1.

Table 1 — Sample volumes

Sieve diameter	Sub-sample portion If 0 mm to 8 mm fraction ≤ 50 % w/w total	Sub-sample portion If 0 mm to 8 mm fraction > 50 % w/w total
200 mm	375 ml	125 ml
300 mm	750 ml	250 ml

8 Air drying

Take three representative appropriate volumes (see Table 1) of the sample as received using an apparatus for sample division (5.6) and place them into 3 separate drying trays. Spread the sample over the surface of the tray as uniformly as possible and weigh. Place the trays in the drying oven (5.3) at 40 °C for at least 16 h and re-weigh. Calculate the moisture loss.

After drying, the remaining moisture content in the sub-samples shall not exceed 15 % of the total weight. The moisture content shall be determined as described in EN 13040:2007.

9 Procedure

Determine the particle size distribution within 24 h after drying. Store the sample in a dry atmosphere until sieving can be performed.

NOTE As samples absorb moisture, volume changes can occur.

Assemble the sieves in order of aperture size, with the largest aperture at the top, on top of the reception tray on the sieving machine. Distribute all the dried sub-sample (Clause 8) equally on the upper sieve. Place the lid on the upper sieve and secure the sieves. Switch on the sieving machine for 7 min at the prescribed setting (Clause 6). Determine the weight fractions of each sieve and of the reception tray. Dry-clean the sieves and the reception tray. When the three sub-samples have been sieved and weighed, determine the empty weights of the sieves and the reception tray. Calculate the fraction distribution as described in 10.2.

10 Calculations and expression of results

10.1 Calculation of fraction distribution during sample pre-treatment

Calculate the fraction distribution during sample pre-treatment as follows:

The sieving fraction greater than 8 mm is given by

$$\text{Sieving fraction} > 8\ \text{mm}\ (\%\ \text{by mass}) = \frac{c - d}{(c-d)+(a-b)} \times 100\% \qquad (1)$$

The sieving fraction smaller than 8 mm is given by

$$\text{Sieving fraction}\ 0 - 8\ \text{mm}\ (\%\ \text{by mass}) = \frac{a-b}{(c-d)+(a-b)} \times 100\% \qquad (2)$$

where

a is the weight of reception tray plus sample, expressed in g;

b is the weight of the empty reception tray, expressed in g;

c is the weight of the 8,0 mm sieve plus sample, expressed in g;

d is the weight of the empty 8,0 mm sieve, expressed in g.

10.2 Calculation of fraction distribution of a sample

The portion masses are expressed on the total mass of the sample.

$$\text{Fraction mass } Z_x = \frac{A_x}{\sum A_x} \times 100 \text{ weight\%} \quad (3)$$

where x = 1...7

1 - sieve 31,5 mm

2 - sieve 16 mm

3 - sieve 8 mm

4 - sieve 4 mm

5 - sieve 2 mm

6 - sieve 1 mm

7 - reception tray

$A_{1...7}$ = (weight sieve plus sample - weight empty sieve).

For each fraction determine the average and round it to the nearest whole percent. Then determine the coefficient of variance of the three sub-samples according to the calculation below (example calculation of portion x). Do this for portions 2 to 6 and only for the three largest fractions. Disregard the portion of > 31,5 mm.

If the coefficient of variance of a portion is greater than 20 % the sample should be considered as insufficiently homogenous. The analysis should be repeated in its entirety.

$$\text{Average } G_x = \frac{\sum Z_x}{n} \quad (4)$$

where: n = *number of replicates (3 or 4)*

$$\text{Coefficient of Variance } Vc_x = \frac{\sqrt{\sum (Z_x - G_x)^2 / (n-1)}}{G_x} \times 100 \quad (5)$$

11 Precision

Typical performance characteristics for precision and accuracy are shown in Table B.1 to Table B.7.

12 Test report

The test report shall include the following information:

a) reference to the European Standard (EN 15428:2007);