SLOVENSKI STANDARD
SIST EN 12948:2003

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Materiali za apnjenje – Ugotavljanje porazdelitev velikosti pri suhem in mokrem sejanju

Liming materials - Determination of size distribution by dry and wet sieving

Calcium-/Magnesium-Bodenverbesserungsmittel - Bestimmung der Korngrößenverteilung durch Trocken- und Nasssiebung

Amendements minéraux basiques - Détermination de la distribution granulométrique par tamisage a sec ou a l'état humide

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

This document EN 12948:2002 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of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The dry sieving of powdered material containing individual particles can be carried out quite easily. This method is simple, quick, cheap and enables the determination of the particle size of water-soluble materials. Therefore the dry sieving method should always be used first. However, the sieve apertures can become blocked by sample particles, a phenomenon known as blinding. Blinding is mainly caused by caking and the production of electrostatic charges, particularly on sieves with small apertures. Dry sieving of very wet material can also lead to blinding. These difficulties are not encountered with the wet sieving method, which is applicable to any kind of material such as powders (dry or wet), paste-like products or granules except those containing water-soluble constituents.

In order to ensure the comparability of results, all masses of size fractions are expressed as dry matter.

1 Scope

This European Standard specifies two methods for the determination of the particle size distribution of liming materials.

The dry sieving method (method A) is applicable to all liming materials except wet and paste-like products.

Method A is not applicable, if blinding, caking, electrostatic charges or agglomeration occur after predrying.

The wet sieving method (method B) is applicable to products which are susceptible to blinding, caking, electrostatic charges or agglomeration after predrying.

Method B can be used to determine the primary particle size distribution of granulated products.

Method B is not applicable to burnt lime and liming materials containing water-soluble constituents.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1235:1995, *Solid fertilizers — Test sieving (ISO 8397:1988, modified).*

EN 1482, *Sampling of solid fertilizers and liming materials.*

EN 12048, *Solid fertilisers and liming materials — Determination of moisture content — Gravimetric method by drying at (105 ± 2) °C (ISO 8190:1992, modified).*

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

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

3 Principle

3.1 Method A

Dry sieving of a liming material with one or more test sieves by hand or using a mechanical sieving machine.

3.2 Method B

Dispersion of agglomerated or granulated liming materials with water.

Wet sieving of the dispersed liming materials under continuous water spraying by hand or using a mechanical sieving machine. Drying of the different fractions retained on the sieves.

4 Apparatus

Usual laboratory apparatus and in particular the following.

4.1 Balance, capable of weighing to the nearest 0,01 g.

4.2 Mechanical shaker (sieving machine), capable of imparting both horizontal and vertical motion to material inside a nest of sieves, fitted with a lid with a water intake and a receiver with a water outlet when used for method B.

NOTE Hand sieving can be carried out instead of mechanical sieving.

4.3 Stainless steel woven wire test sieves, conforming to ISO 3310-1 and of appropriate nominal aperture sizes.

4.4 Stopwatch

4.5 Soft brush

4.6 Oven, capable of being controlled at (105 ± 2) °C.

5 Sampling

Sample the liming material in accordance with EN 1482.

6 Procedure

6.1 Test portion

The whole laboratory sample shall be divided in equal test portions of at least 100 g. The size of the test portions will vary according to the coarseness of the laboratory sample and shall be in accordance with EN 1235:1995, Table 1, subject to a minimum of 100 g.

6.2 Method A

6.2.1 Preparation of test portions

Dry wet samples if there is a possibility that blinding of the sieves could occur during the sieving.

Dry the wet sample in an oven (4.6) at (105 ± 2) °C for an appropriate period of time (see EN 12048).

Check whether agglomeration occurs after drying by carrying out a preliminary sieving test.

Use method B if agglomeration occurs.

6.2.2 Determination

WARNING — When sieving burnt or hydrated lime products, it is essential that precautions are taken to avoid inhalation and skin contact with the product. It is recommended that operations are carried out under a fume hood and appropriate gloves are worn.

6.2.2.1 Carry out at least two single determinations on separate test portions prepared from the same laboratory sample.

6.2.2.2 Select a maximum of seven test sieves (4.3) from the range of principal sizes listed in ISO 565 to cover the range of particle size expected.

Assemble the sieves in ascending order of aperture size on top of the receiver.

Weigh the test portion (6.1) to the nearest 0,01 g per 100 g of test portion, place it on the top sieve and fit the cover.

6.2.2.3 Place the sieve or the assembled nest of sieves on the mechanical shaker (4.2) and shake for exactly 10 min (use a stopwatch (4.4)).

6.2.2.4 If a nest of sieves is used, remove the sieves from the nest and weigh the quantity retained on each sieve and in the receiver to the nearest 0,01 g. Remove particles caught in the mesh of the sieve by brushing the reverse side of the sieve.

6.2.2.5 If only one sieve is used, discard the undersize fraction that has passed through the sieve. Repeat the sieving process for exactly one minute. If more than 0,2 g passes through the sieve, repeat the procedure as many times as necessary. Remove particles caught in the mesh of the sieve by brushing the reverse side of the sieve. Weigh the oversize fraction.

6.3 Method B

6.3.1 General

Use an additional test portion to determine the moisture content in accordance with EN 12048.

Carry out at least two single determinations on separate test portions prepared from the same laboratory sample.

6.3.2 Determination

6.3.2.1 Non-granulated and non-agglomerated products

6.3.2.1.1 Select a maximum of seven test sieves (4.3) from the range of principal sizes listed in ISO 565 to cover the range of particle size expected.

Assemble the sieves in ascending order of aperture size on top of the receiver.

Weigh the test portion (6.1) to the nearest 0,01 g per 100 g of test portion, place it on the top sieve and fit the lid with the intake for water.

6.3.2.1.2 Place the assembled nest of sieves on the mechanical shaker (4.2) and shake under a continuous water flow of 2,0 l/min to 2,5 l/min for exactly 10 min (use a stopwatch (4.4)).

Set the mechanical shaker to a medium vibration frequency throughout the sieving.

6.3.2.1.3 Remove the sieves from the mechanical shaker and rinse the residues of each sieve quantitatively into separate 250 ml pre-weighed beakers.

Decant or pipette most of the water on the top of the material, ensuring that no material is spilled.

Dry each of the oversize fractions in an oven (4.6) at (105 ± 2)°C and then weigh each fraction separately (see EN 12048).

6.3.2.2 Granulated and agglomerated products

Weigh the test portion (6.1) to the nearest 0,01 g per 100 g of test portion and transfer it into a 800 ml beaker.

Add approximately 500 ml of water. Stir the granules for 10 min by means of a mechanical stirrer with a rotational speed not exceeding 800 min^{-1}. Avoid grinding.

Rinse out the sample completely on to the top sieve and fit the lid with the intake for water.

Continue according to 6.3.2.1.2 and 6.3.2.1.3.

NOTE If the sum of individual masses is less than 95 % of the original mass, it should be assumed that the sample contains water-soluble constituents.

7 Expression of results

7.1 Method A

7.1.1 Record the masses of the fractions retained on the sieves and the receiver (see 6.2.2.4 and 6.2.2.5).

7.1.2 Calculate each mass fraction as a percentage of the mass of the test portion (see EN 1235:1995, Annex ZA) according to equation (1).

$$w_{n,1} = \frac{m_{n,1} \times 100}{m_{t,1}} \quad (1)$$

where

$w_{n,1}$ is the mass fraction retained on sieve n or in the receiver, in percentage;

$m_{n,1}$ is the mass retained on sieve n or in the receiver, in grams;

$m_{t,1}$ is the mass of the test portion, in grams.

7.2 Method B

7.2.1 Record the masses of the fractions retained on the sieves (see 6.3.2.1.3).

7.2.2 Calculate each mass fraction as a percentage of the mass of the test portion (see EN 1235:1995, Annex ZA) according to equation (2).