CEN/TC 223/WG 8 "Physical contamination"
WG Secretariat: **NEN**
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WI 00223112 Draft prEN 16202 - Compost and digestate - Determination of the content of macroscopic impurities and stones

Document type	Related content	Document date	Expected action
Project / Draft		2021-10-01	**INFO**

Description

Please find enclosed draft prEN 16202: Compost and digestate — Determination of the content of macroscopic impurities and stones. This is the version that has been submitted to CEN enquiry and will be activated as a New Work Item Proposal. After the activation, we are able to work on the document further.

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Introductory element — Main element — Complementary element

Einführendes Element — Haupt-Element — Ergänzendes Element

Élément introductif — Élément central — Élément complémentaire

ICS:

CCMC will prepare and attach the official title page.

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European foreword

This document (WI 00223112) 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 still under discussion within the WG.

This document will supersede CEN/TS 16202:2013.

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

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

Introduction

This European Standard is applicable for compost and digestate.

Safety warning

Care is to be taken when handling samples, since they may contain sharp fragments, chemical contaminants, pathogenic organisms or be of dusty nature. Samples should be handled with latex gloves. When handling dusty materials also wear a mask.

1 Scope

This document specifies a method to determine the macroscopic impurities > 2 mm and stones > 5 mm in compost and digestate. Macroscopic impurities are contaminants that are not naturally occurring in soil such as pieces of glass, metal, plastics, rubber cigarette buds etc. This method is not able to make a distinction between compostable and non-compostable plastics.

Fragments of wood or bark are acceptable constituents of the sample and not classified as macroscopic impurities.

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

EN 12579:—[2], *Soil improvers and growing media — Sampling*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in WI 00223124:—[3] apply.

3.1
compost
solid particulate material that is the result of a thermophilic aerobic composting of biodegradable matter by microorganisms, which has been sanitised and stabilised.

3.2
digestate
solid or liquid product that is the result of anaerobic digestion of biodegradable materials by microorganisms

3.3
glass
usually transparent, lustrous, hard and brittle material, generally composed of a silicate (such as silicon oxide, or quartz) combined with an alkali and sometimes other substances

3.4
metal
usually crystalline solid of rigid or malleable non-brittle material e.g.. steel, iron, copper, lead and tin

3.5
plastic
solid material which is usually man-made, oil-based, mouldable when soft, and light in weight

[1] Under preparation. Stage at the time of publication: prEN 13040:—..
[2] Under preparation. Stage at the time of publication: prEN 12579:—..
[3] Under preparation. Stage at the time of publication: WI 00223124:—..

Note 1 to entry: Most plastics are polymers. Plastics include bio sourced and biodegradable plastics which are manufactured by using plants or bacteria; bioplastics are biodegradable.

3.6
stone
hard solid non-metallic mineral matter of which rock is made and of a small or moderate size

4 Principle

The particle size of impurities is determined by their ability to go through the sieve (sieve diameter). Macroscopic impurities > 2 mm and stones > 5 mm are determined by mass.

5 Apparatus

5.1 Sample trays, constructed of material thermally stable up to 100 °C, surface approximately 1 250 cm^2.

5.2 Drying oven, ventilated, fan assisted, capable of holding sample trays at (80 ± 5) °C.

5.3 Balance, maximum load 2 kg with an accuracy of 0,01 g.

5.4 Sieves (for macroscopic impurities other than stones and liquid digestate), diameter 200 mm or 300 mm, with 2 mm and 40 mm square apertures.

5.5 Sieves (for stones), diameter 200 mm or 300 mm, with 5 mm and 40 mm square apertures

5.6 Tweezers/forceps.

6 Procedure

6.1 Sample preparation

6.1.1 Large particles

Prepare the test sample in accordance with EN 13040. Where 80 % by mass or more of the sample passes a 40 mm sieve (5.4), the procedure can be continued. If not, the method is not applicable because the material contains too many large particles.

6.1.2 Amount of laboratory sample

Determine the amount of sample to be analysed depending on the coarseness of the sample. For a sample with particles:

— up to 12 mm, take a minimum of 1 kg of material,

— up to 25 mm in size, take approximately 1,5 kg of material,

— up to 40 mm in size, take a minimum of 2 kg material.

Then put the sample in the sample trays (5.1).

6.2 Decision on wet or dry sieving

The decision on the application of the wet or dry sieving method shall be based on the expected physical appearance of the sample after drying. This is because the physical appearance after drying determines the suitability of the sample for dry sieving.

The judgement on the expected physical appearance of the sample after drying shall be based on the particle size distribution, organic matter content and viscosity of the non-dried sample. If it is expected that drying of the sample will lead to a clogged material which cannot easily be dry sieved, then the wet sieving method shall be applied. If it is expected that drying will lead to a loose, crumbly sample which can easily be dry sieved, then the dry sieving method shall be applied. In case of doubt, the wet sieving method shall be applied.

Figure 1 visualizes the steps in both the dry and wet method and how they are related.

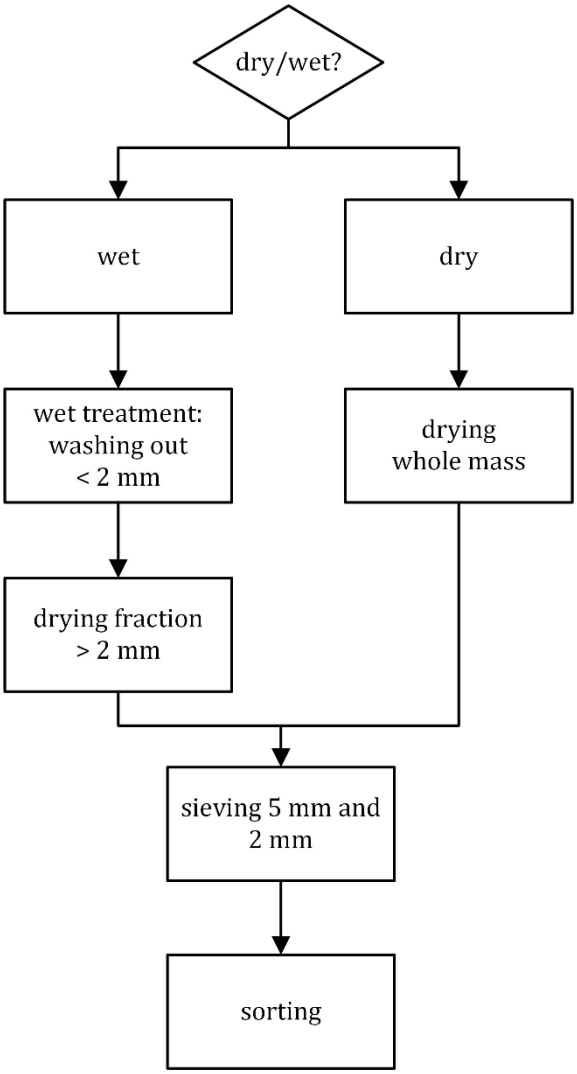

Figure 1. Graphic presentation for choosing wet or dry sieving

6.2.1 Wet sieving method–washing and drying of fraction > 2 mm

The purpose of wet sieving is to wash out all the material smaller than 2 mm. In this step only a sieve with 2 mm mesh size is used (5.4). The sample is washed with water in a 2 mm sieve, in aliquots to prevent clogging of the sieve. If necessary, rub manually in order to remove the organic matter adhering to the surface of the physical impurities. The fraction > 2 mm is dried at 80 °C ± 5 °C in a drying oven (5.2) for at least 16 h until constant weight is obtained.

6.2.2 Dry sieving method–drying test portion

Dry the materials for at (80) °C ± 5 °C) in a drying oven(5.2) for at least 16 h until constant weight is obtained.

6.2.3 Sieving 5 and 2 mm

After the wet sieving step (6.2.1), dry the > 2 mm fraction and sieve it. In the first step, a sieve with 5 mm mesh is used (5.4). In the second step, the fraction < 5 mm is sieved with 2 mm mesh size (5.5).

If the dry sieving method has been applied, the entire dried sample shall be sieved in portions to prevent clogging of the sieve. In the first step, a sieve with 5 mm mesh size is used (5.4). By manually rubbing on the surface the sieve lumps by the drying process should be crushed. In the second step, the fraction <5 mm is sieved with 2 mm mesh size (5.5). The fraction > 2 mm is washed with water, and manually rubbed if necessary, in order to remove the organic matter adhering to the surface of the physical impurities. Then dry at 80 °C in a drying oven (5.2) for at least 16 h until constant weight is obtained.

6.2.4 Weighing

Determine the mass of the dried sample using the balance (5.3).

The sieve fraction > 5 and 2 mm to 5 mm is kept for further investigations (sorting out stones > 5mm and sorting out impurities > 2mm). The undersize <2 mm is discarded.

6.2.5 Sorting stones > 5mm

Spread the fraction > 5mm one by one (in one pass a maximum of 100 ml of test substrate) on a flat surface and sort out all visual recognisable stones manually. Determine the mass of the stones using the balance (5.3)Record the data for the mass of stones.

6.3 Sieve analysis

6.3.1 Sorting impurities > 2 mm

The sorting of the impurities is carried out separately for the fraction > 5 mm and the fraction >2 mm to 5 mm. Spread the fractions > 5mm respectively 2 mm to 5 mm one by one (in small increments of material) on a light coloured surface and sort out all visual recognisable impurities using the tweezers or forceps (5.8). To identify FE metals, a magnet can be applied. This procedure has to be repeated for the whole testing substrate. Bring together the out-sorted impurities from the fraction > 5 mm and the fraction of 2 mm to 5 mm for weighing. Before determining the mass, the impurities shall be manually cleaned by rubbing if necessary (in order to remove attachments of minerals or organic matter especially on crushed plastics). Determine the mass of the individual type of impurities using the balance (5.3). Record the data separately for glass, metal, plastics and other impurities. The data to be recorded are given in Table 2.

Table 2 — Data to be recorded after sieving of samples

Material	Mass g
Glass > 2mm	m_G
Metal > 2mm	m_M
Plastics > 2mm	m_P
Other impurities > 2mm	
Stones > 5mm	

7 Calculations and expression of results

The mass of each of the impurities is expressed on the total dry mass of the sample before sieving, using Formula 1:

$$I_i = \frac{m_i}{m_s} \times 100 \quad (1)$$

where

I_i is the impurity fraction of impurity type, in percent (mass fraction);

m_i is the mass of impurity type > 2 mm, in grams (g);

m_s is the total dry mass of the sample before sieving, in grams (g).

Report the result for each of the impurities (glass, metal, plastics) in percent (mass fraction). Round the results to two significant digits.

8 Precision data

The performance characteristics of the method data have been evaluated for certain matrices (Annex A).

9 Test report

The test report shall contain the following information:

a) a reference to this document (including its year of publication);

b) complete identification of the sample;

c) the results of the different fractions expressed according to Clause 7;

d) any details not specified in this European Standard or which are optional, as well as any factor which may have affected the results.

Annex A
(informative)

Repeatability and reproducibility data

A.1 Materials used in the interlaboratory comparison study

The validation study of determination of impurities in compost and digestate was carried out with *** to *** European laboratories on *** materials. The materials selected for the interlaboratory comparison were chosen to represent compost and digestate as broadly as possible. Detailed information can be found in the final report on the validation study mentioned in the Bibliography [***].

Table A.1 provides a list of the material chosen for testing and the selected components.

Table A.1 — Material tested in the interlaboratory comparison of the method for the determination of impurities in compost and digestate

Grain size class	Code and material
0 mm to 10 mm	A: Biowaste compost
0 mm to about 25 mm	B: Green compost
0 mm to about 25 mm	C. Solid digestate A: Horticultural green compost
0 mm to 5 mm	D: Liquid digestate

A.2 Validation study results

The statistical evaluation was conducted according to ISO 5725-2. The average values, the repeatability standard deviation (s_r) and the reproducibility standard deviation (s_R) were obtained (Table A .2).

Table A.2 — Results of the interlaboratory comparison studies of the determination of impurities (dry sieving) in compost and digestate

Matrix	Parameter	l	n	n_o	$\bar{\bar{x}}$ %	BD	s_r	$C_{V,r}$ %	s_R	$C_{V,R}$ %

Bibliography

[1] Regulation (EU) No 2019/1009 of the European Parliament and of the Council laying down rules on the making available on the market of CE marked fertilizing products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009

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

[3] The Glossary of Soil Science Terms. Soil Science Society of America, 2001 — SSA 2001, https://www.soils.org/publications/soils-glossary

[4] Methodenbuch zur Analyse organischer Düngemittel, Bodenverbesserungsmittel und Substrate, Bundesgütegemeinschaft Kompost (2006)

[5] WI 00223124:—, *Soil improvers and growing media : Terminology*

[6] *** to be added: final report on the validation study***