CEN/TC 223/WG 4 "Analytical methods"
WG Secretariat: **ASI**
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Document type	Related content	Document date	Expected action
Project / Draft		2021-12-02	

Description

Please find enclosed the 1st working draft on WI 00223104, Soil improvers and growing media – Determination of the aerobic biological degradation rate of organic matter — Part 2: Self-heating test for compost.

As agreed during the last meeting of WG 4 on 2021-11-09, the enclosed 1st working draft and the forms for the activation of the work item will be circulated to CEN/TC 223 as soon as the call for tender for the project leaders is completed and the project leaders are known.

CEN/TC 223

Date: 2021-11

prEN 16087-2:2021

Secretariat: NEN

Soil improvers and growing media — Determination of the aerobic biological degradation rate of organic matter — Part 2: Self-heating test for compost

Bodenverbesserungsmittel und Substrate — Bestimmung der aeroben biologischen Abbaurate organischer Substanz — Teil 2: Selbsterhitzungstest für Kompost

Amendements organiques et support de culture — Détermination du taux de biodégradation aérobie de la matière organique— Partie 2 : Test d'auto échauffement pour compost

ICS:

CCMC will prepare and attach the official title page.

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European foreword

This document (prEN 16087-2:2021) 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 16087-2:2011.

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

- A more precise description of the fist test was added.

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

1 Scope

This European Standard describes a method to determine the aerobic biological activity using a self-heating test. This method is only applicable to composted material.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TS 00223137:—[1] apply.

4 Principle

Measurement of self-heating in a Dewar vessel and measurement of the maximum temperature, where the temperature is an indicator of the state of aerobic biological activity.

5 Apparatus

5.1 Dewar vessel

Volume 1,5 l, internal diameter 100 mm ± 3 mm.

5.2 Temperature measurement device

Capable of recording a maximum temperature with an accuracy of ± 2 °C.

5.3 Sieve

10 mm mesh size mm square aperture size.

5.4 Temperature controlled room or climate cabinet

The temperature of 20 °C ± 2 °C.

6 Procedure

6.1 General

The self-heating test shall be carried out as soon as possible after sampling. If a delay to the start of testing cannot be avoided, cool storage (3 °C ± 2 °C for up to three days) of the samples is then necessary. Ensure that the temperature of the sample material corresponds to a temperature of 20 °C ± 2 °C at the beginning of the test.

Record the ambient temperature during the trial to ensure that the required temperature is maintained.

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

6.2 Sample preparation

6.2.1 General

The fresh test sample (3 litres per single measurement) is sieved < 10 mm (see 5.3). If more than 30 % of the material is retained on the sieve, the method is not appropriate. The moisture content is adjusted according to the results of a fist test (see 6.2.2).

NOTE Optimal compost sample moisture conditions (30% m/m to 65% m/m) should be maintained for successful application of the self-heating procedure.

6.2.2 Fist test

To ascertain that the moisture content of the compost is in an optimal range for microbial activity and prior to testing, the moisture content might need adjustment. The optimal moisture content shall be assessed by applying the 'fist test' to a subsample of compost.

NOTE The fist test should be carried out wearing protective gloves.

A large enough subsample of the test material is taken into the hand so that the fist is filled with compost. Adequate fist pressure is applied to allow any surplus water to escape between the fingers.

If water escapes between the fingers, the sample is too moist.

If, without any further action, the sample crumbles in the opened fist, it is too dry.

If the sample forms an aggregate, which crumbles under mild pressure in the opened fist, the moisture content of the compost can be assessed as being in an optimal range.

Samples that are too dry shall be evenly moistened and hand-mixed with tap water until the optimal moisture range is obtained. For very dry composts this moistening procedure will have to be repeated in intervals allowing good water uptake until the optimal moisture range is obtained.

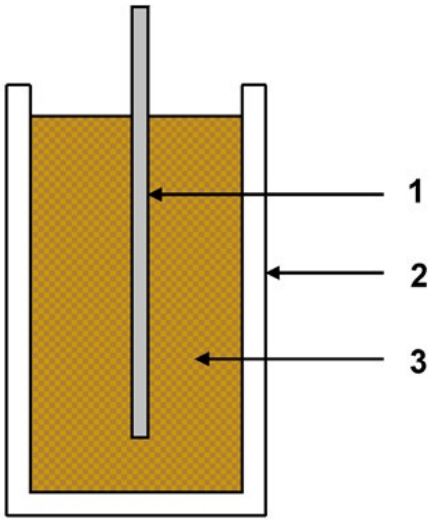
Samples that are too moist shall be air-dried at temperatures not exceeding 30 °C. The drying process shall include hand-mixing at appropriate intervals to allow the compost to dry homogenously.

The maximum time from sampling to the start of the test shall not exceed five days.

6.3 Determination of self-heating

Once the optimum moisture range has been ascertained, loosely fill the Dewar vessels (see 3.1) to the top of the rim by intermediately tapping the Dewar vessels on the base. The sensor of the temperature measurement device is then placed vertically in the centre of the vessel in such a way so that its end rests in the lower third section of the vessel. The vessels shall be set up without covering (see Figure 1). The room temperature shall be maintained at 20 °C ± 2 °C for the entire duration of the test. In general, the temperature maximum (T_{max}) will drop after two to five days.

NOTE If a high precision for the monitoring of the temperature rise is required (for example for materials low in biological activity like "mature" composts), the test should be carried out under temperature controlled conditions.



Key

1 temperature measurement device

2 open Dewar vessel

3 sample

Figure 1 — Setup of the measurement

The test ends after the temperature maximum has been reached and the temperature is dropping, but after ten days at the latest.

If continuous recorders or devices with digital measurement are not available, the measurement shall be performed in duplicate (within 24 hours at least 2 measurements with a time difference of at least 8 hours).

7 Expression of results

The result of the test is T_{max} expressed in °C and the corresponding Rottegrad (Table 1). In case of duplicate, the result of the test is the mean T_{max}.

NOTE The German word Rottegrad is equivalent to the degree of decomposition.

Table 1 — Rottegrad and corresponding temperature ranges

Rottegrad	Maximum temperature [*Tmax* °C]
I	> 60
II	60-50,1
III	50-40,1
IV	40-30,1
V	≤ 30

8 Test report

The test report shall contain at least the following:

a) a reference to this standard;

b) all data required for a complete identification of the sample;

c) the maximum temperature in °C, rounded to one decimal place;

d) if required, the temperature profile of the sample during analysis;

e) details of all work cycles not contained in this standard or that were considered optional, as well as all factors that may have influenced the results.

Annex A
(informative)

Validation

In Table A.1, the results of the interlaboratory trial are shown (results of new ringtest to be added).

Table A.1 — Summary of the results of the self-heating test – T_{max}

°C

Sample	compost 1	compost 2
	°C	
Number of laboratories retained after eliminating outliers	14	14
Number of outliers (laboratories)	0	0
Mean value	22,26	25,30
Repeatability standard deviation, s_r	1,16	1,14
Repeatability relative standard deviation	0,05	0,05
Repeatability limit, $r = 2{,}8\ s_r$	3,25	3,19
Reproducibility standard deviation, s_R	2,19	2,59
Reproducibility relative standard deviation	0,10	0,10
Reproducibility limit, $r = 2{,}8\ s_R$	6,13	7,25

Bibliography

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