SLOVENSKI STANDARD
SIST EN 14045:2003

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Embalaźa ï Vrednotenje razkroja embalaźnih materialov v praktiļ nih preskusih pod doloļ enimi pogoji kompostiranja

Packaging - Evaluation of the disintegration of packaging materials in practical oriented tests under defined composting conditions

Verpackung - Bewertung der Desintegration von Verpackungsmaterialien in praxisorientierten Prüfungen unter definierten Kompostierungsbedingungen

Emballage - Evaluation de la désintégration des matériaux d'emballage lors d'essais a usage pratique dans des conditions de compostage définies

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13.030.99	Drugi standardi v zvezi z odpadki	Other standards related to wastes
55.040	Materiali in pripomoļ ki za pakiranje	Packaging materials and accessories

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Foreword

This document (EN 14045:2003) has been prepared by Technical Committee CEN/TC 261 "Packaging", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

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

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Organic recovery, which includes aerobic composting and anaerobic biogasification, of packaging in well operated, especially municipal or industrial biological waste treatment facilities are important alternatives for reducing and recycling packaging waste in a biological way. Using these technologies, the aims of the European Directive 94/62/EC on Packaging and Packaging Waste can be met.

1 Scope

This European Standard is used to evaluate the disintegration of packaging materials in a pilot-scale aerobic composting test under defined conditions. Other methods should be used to measure the biodegradability of the packaging materials. Packaging materials are mixed with biowaste and spontaneously composted for 12 weeks in practical oriented composting conditions. At the end of the composting cycle the disintegration is measured by sieving of the compost and the calculation of a mass balance. The influence of the tested sample on the quality of the compost can be studied by using the compost obtained at the end of the composting process for further measurements such as chemical analyses and ecotoxicity tests.

Additionally this method can be used for visual perception and photographic documentation of the disintegration of packaging materials and for evaluating the effect of their addition on the composting process.

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 13193: 2000, *Packaging – Packaging and the environment – Terminology.*

ISO 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate.*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions and those given in EN 13193:2000 apply.

3.1
maturity of compost
stage of development of compost

3.2
total dry solids
amount of solids obtained by taking a known mass of test material or compost and drying at 105 °C to constant weight

3.3
volatile solids
amount of solids obtained by subtracting the residues of a known mass of test material or compost after incineration at about 550 °C from the total dry solids content of the same sample

4 Principle

The disintegration test under defined composting conditions on a pilot-scale level is a standardized composting process.

The test material is mixed in a precise concentration with fresh biowaste and introduced in a defined composting environment after which the biological composting process spontaneously starts. A natural ubiquitous microbial population will start the composting process and temperature increase will happen spontaneously. The composting mass is regularly turned over and mixed. The temperature, pH, moisture content and gas composition within the composting material are regularly monitored and have to fulfill certain requirements in order to ensure sufficient and appropriate microbial activity. The composting process is continued till fully stabilized compost is obtained (after 12 weeks).

At the end of the composting process, the compost / test material mixture is sieved over 2 and 10 mm. Disintegration of the packaging material is evaluated after sieving procedure (6.1.3.2.). If possible a mass balance is calculated on the basis of wet and dry weight. The compost obtained at the end of the composting process can be used for further measurements such as chemical analyses and ecotoxicity tests.

5 Apparatus

5.1 Composting environment

5.1.1 General

Composting environment may be either a pilot-scale composting bin or nets buried in a pilot-scale composting bin. The volume of each bin shall be high enough for natural self-heating process to occur. Sufficient aeration shall be provided by an air providing system and air distribution should be even.

NOTE To standardize conditions for the test the composting trials can be run in bins, which are placed in a climatic chamber with a constant chamber temperature or in insulated bins.

If during the spontaneous thermophilic phase the compost mass reaches temperatures higher than 65 °C the microbial species diversity could be reduced. To restore a full array of thermophilic microbes, it is possible to re-incoculate the mass with mature compost (1 % of total initial biowaste mass) of recent origin (max. 3 months).

Reinoculationcan be done after the temperature peak at start. Additionally, it is possible to restore a full array of mesophilic microorganisms by reinoculating with mature compost (1% of total initial biowaste mass) of recent origin (max.3 months)after the thermophilic period in the test is over (or in other words : at the start of the mesophilic period in the test, e.g. after 4 or 6 weeks).

5.1.2 Composting bin

5.1.2.1 Volume and fitting

The bins shall :

— have a volume of minimum 140 l ;

— consist of a sturdy, heat resistant up to 120 °C and non-biodegradable material ;

— not effect the compost process and the quality of the compost.

5.1.2.2 Drainage

A draining system shall be constructed such that the compost will not flood.

5.1.3 Sample nets

The sample nets, if used, shall consist of mesh-like material with a mesh width of 1 mm made of non-degradable plastic, which is resistant to temperatures up to 120 °C.

The minimum volume shall be 20 l.

5.2 Apparatus for temperature measurement

Measuring range (0°C - 100°C) ± 1°C

5.3 pH meter

5.4 Apparatus for oxygen analysis (e.g. gas chromatography)

5.5 Sieves with screens of 2 and 10 mm (according to ISO 3310-2)

6 Procedure of the test

6.1 Actions during incubation

6.1.1 Start-up of the test

6.1.1.1 Preparation of biowaste

The carrier matrix for the composting test consists of biowaste. It is important that for all test series a homogeneous biowaste of the same age and origin is used. The biowaste shall be reduced to particle sizes of maximum 50 mm (e.g. by shredding or sieving). Depending on the type of waste 10 % to 60 % of bulking agent of structurally stable components such as wood chips, bark, etc. with a size between 10 mm and 50 mm shall be added. In order to ensure a good composting process the biowaste shall fulfil the following criteria :

— C/N ratio of the fresh biowaste/bulking agent mixture shall be between 20 and 30 ;

— moisture content shall be above 50 % (*w/w*) not exceeding its water holding capacity;

— volatile solids content shall be above 50 % (*w/w*) ;

— pH shall be above 5.

NOTE 1 A representative sample of the biowaste should be mixed with demineralised water in a ratio of 1:5 (wet weight based), it should be left to it settle for 5 min and then the pH in the liquid phase should be measured.

NOTE 2 In order to correct the C/N-ratio, urea can be added.

The biowaste is obtained from the input material from a composting plant treating predominantly source separated organic municipal waste. Or, less satisfactorily, directly from households, grocery stores etc.

Alternatively a representative artificial (self-composed) biowaste can be used.

NOTE 3 As an example the following ingredients can be used :

— fresh mixed fruit and vegetable waste ;

— rabbit feed (seeds and dried extruded vegetables) ;

— matured compost ;

— urea (to adjust the C/N-ratio) ;

— plus sufficient water to attain a good moisture content ;

— plus bulking agent (e.g. woodchips or bark).

NOTE 4 After sieving at 50 mm, biowaste (especially urban biowaste) should not bring any packaging pieces which may be included in the disintegration results of the tested packaging.

6.1.1.2 Preparation of the test material

a) If the purpose of test is only measurement of disintegration, composting process and compost quality :