

**Plast – Utvärdering av komposterbarhet –
Provningsschema och specifikationer**

**Plastics – Evaluation of compostability –
Test scheme and specifications**

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Postadress: SIS Förlag AB, 118 80 STOCKHOLM
Telefon: 08 - 555 523 10. *Telefax:* 08 - 555 523 11
E-post: sis.sales@sis.se. *Internet:* www.sis.se

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN 14995:2006 (E)

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Foreword

This document (EN 14995:2006) has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN/BIN.

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of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

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

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Introduction

This European Standard defines the requirements for plastic materials to be considered organically recoverable. It provides a framework which can be used to support claims of compostability of plastics. The approach of this European Standard is comparable to that of EN 13432 which defines the requirements for packaging materials.

Organic recovery of used plastic materials is one of several recovery options within the overall life cycle of plastic materials.

This European Standard presents a framework for assessment to determine whether the requirements of this European Standard have been met. Its approach is similar to that of systems standards such as the EN ISO 9000 and EN ISO 14000 series.

1 Scope

This European Standard specifies requirements and procedures to determine the compostability or anaerobic treatability of plastic materials by addressing four characteristics:

- I) biodegradability,
- II) disintegration during biological treatment,
- III) effect on the biological treatment process and
- IV) effect on the quality of the resulting compost.

NOTE For packaging EN 13432 applies.

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 ISO 14851, *Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium - Method by measuring the oxygen demand in a closed respirometer (ISO 14851:1999)*

EN ISO 14852, *Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium — Method by analysis of evolved carbon dioxide (ISO 14852:1999)*

EN ISO 14855, *Determination of the ultimate aerobic biodegradability and disintegration of plastic materials under controlled composting conditions — Method by analysis of evolved carbon dioxide (ISO 14855:1999)*

ISO 16929, *Plastics — Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test*

OECD Guidelines for Testing of Chemicals 208: *Terrestrial Plants, Growth Test; Organisation for Economic Co-operation and Development, 2 rue André Pascal, F - 75775 Paris*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

constituent of a plastic material

every pure chemical material or substance of which a plastic material is composed

3.2

disintegration

physical falling apart into very small fragments of a plastic material

3.3

ultimate biodegradation

breakdown of an organic chemical compound by microorganisms in the presence of oxygen to carbon dioxide, water and mineral salts or any other elements present (mineralization) and new biomass or in the absence of oxygen to carbon dioxide, methane, mineral salts and new biomass

3.4

total dry solids

amount of solids obtained by taking a known amount of plastic material or compost and drying at about 105 °C to constant weight

3.5

volatile solids

amount of solids obtained by subtracting the residues of a known amount of plastic material or compost after incineration at about 550 °C from the total dry solids content of the same sample. The volatile solids content is an indication of the amount of organic matter

4 Requirements

4.1 Control of constituents

Constituents known to be, or expected to become, harmful to the environment during the biological treatment process (see Clause 8), in excess of the limits given in A.1, shall not be deliberately introduced into plastic materials intended to be designated as suitable for organic recovery.

4.2 Assessment

4.2.1 General

Except as identified in 4.3, assessment of the biological treatability of plastic materials shall include the following 5 assessment procedures as a minimum:

- characterization (4.2.2);
- biodegradability (4.2.3);
- disintegration including effects on the biological treatment process (4.2.4);
- compost quality (4.2.5);
- recognizability (4.2.6).

4.2.2 Characterization

A plastic material under investigation shall be identified and characterized prior to testing including at least:

- information on, and identification of, the constituents of the plastic material;
- determination of the presence of hazardous substances, e.g. heavy metals;
- determination of the organic carbon content, total dry solids and volatile solids of the plastic material used for biodegradation and disintegration tests.

NOTE Chemical characteristics' pass levels need to be met for volatile solids and heavy metals.

4.2.3 Biodegradability

To be designated as organically recoverable, a plastic material shall be inherently and ultimately biodegradable as demonstrated in laboratory tests (Clause 6) and to the criteria and pass levels given in A.2.

4.2.4 Disintegration

To be designated as organically recoverable, a plastic material shall disintegrate in a biological waste treatment process (Clause 7) to the criteria and pass levels given in A.3, without any observable negative effect on the process.

4.2.5 Compost quality

To be designated as organically recoverable, a plastic material submitted to a biological waste treatment process, shall not have a negative effect on the quality of the resulting compost (Clause 8).

4.2.6 Recognizability

A plastic material which is intended for entering the biowaste stream shall be recognizable as compostable or biodegradable by the end user by appropriate means.

4.3 Exemption for the equivalent form

A plastic material demonstrated to be organically recoverable in a particular form, shall be accepted as being organically recoverable in any other form having the same or a smaller mass to outer surface ratio and maximum wall thickness.

4.4 Recording of assessment outcome

4.4.1 Check list

For each plastic material the result of each assessment or test undertaken as required in 4.2.1, shall be recorded on an assessment check list and their outcome used to determine whether a plastic material is biologically treatable and therefore suitable for organic recovery. The check list shall provide data for the identification of any supplementary information.

4.4.2 Supporting documentation

The check list, together with any other information, including externally sourced technical data, necessary to support the conclusions reached in the assessments, shall be retained and made available for inspection if required.

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5 Organization of a test scheme

In view of the relative complexity of some of the procedures involved, it is essential that assessment and testing be undertaken in a formal and organized way. Whilst this European Standard does not attempt to specify such organization, a flowchart of a recommended scheme is provided in Annex B.

Where required, the disintegration test may also be used to obtain information on any negative effects that the plastic material could have on the composting process.

Compost is not only the final product of the aerobic composting process but also the aerobically stabilized product of the anaerobic biogasification process. Where appropriate, an anaerobic disintegration test may be performed additionally.

NOTE It is important to recognise that it is not necessary that biodegradation of a plastic material is fully completed by the end of biological treatment in technical plants but that it can subsequently be completed during the use of the compost produced.

6 Laboratory tests on biodegradability

Only biodegradation tests that provide unequivocal information on the inherent and ultimate biodegradability of a plastic material or its significant organic constituents (see A.2.1.1) shall be used.

The controlled aerobic composting test according to EN ISO 14855 shall be used unless inappropriate to the type and properties of the material under test.

In the event that alternative methods are necessary an internationally standardized biodegradability test method (see e.g. ISO/TR 15462) shall be used, in particular EN ISO 14851 and EN ISO 14852 which are designed for polymeric materials.

NOTE 1 Information on how to handle poorly water soluble test materials for use in aquatic biodegradation tests may be obtained from EN ISO 10634.

NOTE 2 For the purpose of this European Standard it is sufficient to test biodegradability under aerobic conditions. If in a special case additional information on biogasification is required, a method with a high-solids test environment such as ISO 15985 should preferably be used.

For screening anaerobic biodegradability for example ISO 14853 or EN ISO 11734 may be used.

7 Determination of disintegration

Unless technically impossible, the plastic material shall be tested for disintegration in the form in which it will ultimately be used. The controlled pilot-scale test according to ISO 16929 shall be used as the reference test method. A test in a full-scale treatment facility may, however, be accepted as equivalent. The pilot-scale test simulates, as closely as possible, the real conditions of a high-level aerobic composting facility whereas a full-scale facility (technical composting plant) has always by definition real conditions and treatment periods.

In practice plastic specimens of a given material are tested and from the laboratory results the disintegrability of any plastic product produced with that material, having equal or minor thickness, is inferred.

Due to the nature and analytical conditions of the disintegration test (ISO 16929) the test results cannot differentiate between biodegradation and abiotic disintegration but they are required to demonstrate that a sufficient disintegration of the plastic material is achieved within the specified treatment time of biowaste. By combining these observations with the information obtained from the laboratory tests it can be concluded whether a plastic material is sufficiently biodegradable under the

known conditions of biological waste treatment and whether complete biodegradation will happen with the use of the compost.

Pilot-scale composting tests are also suitable instruments for investigating any negative effects of the plastic material on the composting process if sufficient plastic material is introduced. This can be achieved by direct comparison of process parameters in reactors with and without plastic material.

The compost obtained at the end of the disintegration test may be used for analytical and biological quality control testing. When tests on ecotoxicity are performed it is important to use compost from disintegration tests which have been run with and without the plastic material to compare the test results directly and to find out any relative ecotoxic effects (see Clause 8).

NOTE 1 For the purpose of this European Standard it is sufficient to determine disintegration under aerobic composting conditions. If in a special case information on anaerobic treatability is required an anaerobic pilot-scale test or a test in a full-scale facility for solid waste treatment should be used.

NOTE 2 Special attention should be given to the visual aspects of compost. Visual contamination of compost, as evidenced by reduced aesthetic acceptability, should not be significantly increased by any post composting residues of plastic materials introduced.

8 Quality of the final compost

8.1 Rationale

As the quality of compost may be influenced by plastic materials added, it is preferable that evaluation of any possible environmental risk attaching to such compost, should be based upon the best criteria on compost quality available. This may be achieved, for example, by determination of the ecotoxicological effects of the biodegradation products of plastic materials or by performing ecotoxicological tests with compost produced with and without plastic materials and comparison of the test results (see A.4). Other methods for equal purpose and the pass levels required for the evaluation of the test results are, however, not yet established and need to be elaborated before they can be specified as reference methods for the purpose of this European Standard. Test methods and limit values based on such tests may be introduced into future revisions of this European Standard as more experience is gained.

The final compost has to fulfil European or in absence national requirements for compost quality which include analytical and biological tests.

8.2 Determination of negative effect

The supplier of a plastic material, designated as organically recoverable, on the market shall as a minimum establish by a process of direct comparison that the quality of compost produced by a given "controlled waste treatment" process, as defined by the criteria listed below, is not negatively affected by the addition of that plastic material.