

Plastics - Methods for the preparation of samples for biodegradation testing of plastic materials (ISO 10210:2012)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 10210:2017 sisaldab Euroopa standardi EN ISO 10210:2017 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 10210:2017 consists of the English text of the European standard EN ISO 10210:2017.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 06.12.2017.	Date of Availability of the European standard is 06.12.2017.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 83.080.01

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Plastics - Methods for the preparation of samples for
biodegradation testing of plastic materials (ISO
10210:2012)

Plastiques - Méthodes de préparation des échantillons
pour les essais de biodégradation des matériaux
plastiques (ISO 10210:2012)

Kunststoffe - Probenvorbereitung für die Bestimmung
der Bioabbaubarkeit von Kunststoff-Materialien (ISO
10210:2012)

This European Standard was approved by CEN on 17 October 2017.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of ISO 10210:2012 has been prepared by Technical Committee ISO/TC 61 “Plastics” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 10210:2017 by Technical Committee CEN/TC 249 “Plastics” the secretariat of which is held by NBN.

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 2018, and conflicting national standards shall be withdrawn at the latest by June 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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

Endorsement notice

The text of ISO 10210:2012 has been approved by CEN as EN ISO 10210:2017 without any modification.

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Principle	3
5 Reagents	3
5.1 Solid carbon dioxide	3
5.2 Liquid nitrogen	3
6 Apparatus	3
6.1 Sieves	3
6.2 Rotor mill	4
6.3 Rotating mechanical mixer	4
6.4 Ball mill	4
6.5 Sieve shaker	4
6.6 Microscope	4
7 Procedure	4
7.1 Preparation and dimensional control of test material prior to size reduction	4
7.2 Powder/pellet/granule test material	4
7.3 Film and sheet test material	5
7.4 Test material in the form of products	5
7.5 Storage	5
8 Calculation and expression of results	6
8.1 Particle size distribution	6
9 Validity of preparation	6
10 Sample preparation report	6
Annex A (informative) Examples of the preparation and testing of powder test samples produced from pellets by milling using a rotating mechanical mixer	7
Annex B (informative) Examples of the preparation and testing of film and powder test samples produced from PLA film and pellets	13
Annex C (informative) Examples of test samples produced from a plastic product	15
Annex D (informative) Shape and size of pieces of test material used in ISO standards for biodegradation testing of plastics	17
Bibliography	19

Introduction

Plastics recovery technology includes material recycling, organic recycling and energy recovery. The use of biodegradable plastics is one of the valuable recovery options in the field of organic recycling.

ISO standards for determining the ultimate aerobic and anaerobic biodegradability of plastic materials in an aqueous medium, activated sludge, compost, digesting sludge and soil have been published. These standards include ISO 14851, ISO 14852, ISO 14853, ISO 14855-1, ISO 14855-2, ISO 15985 and ISO 17556. For the user of these standards, it might be difficult to compare biodegradation changes during a test, even when using the same samples, due to differences in the test conditions. These differences might arise from the compost preparation, the test preparation methodology, the shape and/or size of the test sample, etc. Accurate comparison of biodegradability data for the same plastic material can be difficult to achieve unless the conditions specified in the standards are accurately followed.

A unified approach to test sample preparation is important in achieving consistency within the standards mentioned above. The methods described in this document help to provide a consistent approach to sample preparation techniques for biodegradation testing of plastic materials.

Plastics — Methods for the preparation of samples for biodegradation testing of plastic materials

WARNING — The use of this International Standard might involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

1 Scope

This International Standard describes methods for the preparation of test samples used in the determination of the ultimate aerobic and anaerobic biodegradability of plastic materials in an aqueous medium, soil, controlled compost or anaerobic digesting sludge. The methods described are designed to provide dimensional consistency of test samples, resulting in improved reproducibility of test results during the determination of the ultimate biodegradability of the product.

These methods apply to the following materials:

- natural and/or synthetic polymers, copolymers or mixtures of these;
- plastic materials that contain additives, such as plasticizers or colorants;
- plastic composite materials that contain organic or inorganic fillers;
- products made from the above materials.

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.

ISO 472, *Plastics — Vocabulary*

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

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 14852, *Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium — Method by analysis of evolved carbon dioxide*

ISO 14853, *Plastics — Determination of the ultimate anaerobic biodegradation of plastic materials in an aqueous system — Method by measurement of biogas production*

ISO 14855-1, *Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions — Method by analysis of evolved carbon dioxide — Part 1: General method*

ISO 14855-2, *Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions — Method by analysis of evolved carbon dioxide — Part 2: Gravimetric measurement of carbon dioxide evolved in a laboratory-scale test*

ISO 15985, *Plastics — Determination of the ultimate anaerobic biodegradation and disintegration under high-solids anaerobic-digestion conditions — Method by analysis of released biogas*

ISO 17088, *Specifications for compostable plastics*

ISO 17556, *Determination of the ultimate aerobic biodegradability of plastics materials in soil by measuring the oxygen demand in a respirometer or the amount of carbon dioxide evolved*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 and the following apply.

3.1

sieve

wire mesh of specified aperture size

3.2

bulk material

test material taken from a polymer product or part of a product

NOTE The size of the bulk polymeric test sample is approximately 1 cm × 1 cm × 1 cm.

3.3

sheet

planar product of arbitrarily limited maximum thickness in which the thickness is small compared to the length and width

NOTE The thickness of sheets is typically 0,5 mm to 3 mm.

3.4

film

thin planar product of arbitrarily limited maximum thickness in which the thickness is very small compared to the length and width and which is generally supplied in roll form

NOTE 1 The arbitrary thickness limit can differ between countries and often between materials.

NOTE 2 The thickness of films is typically 0,01 mm to 0.3 mm.

3.5

pellet

small mass of preformed moulding material, having relatively uniform dimensions in any given batch and used as feedstock in moulding and extrusion operations

NOTE The average diameter of pellets can range from 1 mm to 5 mm.

3.6

granule

relatively small particle produced in various sizes and shapes in operations such as cutting, grinding, crushing, precipitation and polymerization

NOTE 1 These operations can also yield material in the form of powder and, in some precipitation and polymerization processes, material in the form of beads can be produced

NOTE 2 The average diameter of granules can range from 0,1 mm to 3 mm.

3.7

powder

very fine particulate material smaller in size than granules

NOTE The average diameter of polymeric powder particles can range from 0,01 mm to 0,1 mm.

3.8

test material

product from which a test sample is taken and used to assess the biodegradability of a polymeric item by means of standardized biodegradation tests