
**Plastics — Determination of the
degree of disintegration of plastic
materials in marine habitats under
real field conditions**

*Plastiques — Détermination du degré de désintégration des
matériaux plastiques dans les habitats marins en conditions réelles*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Even though plastics that are biodegradable according to established land-based treatment standards are not and never were intended as a solution to marine littering, the United Nations Environment Programme (UNEP) recognizes that "biodegradability in seawater" can be part of the solution (EuBP, 2016; UNEP, 2016). Hence, plastic materials that are biodegradable might be used as a potential alternative option in order to reduce the residence time of plastic waste in case of dispersion. Thus, the degree and rate of disintegration is of interest in order to determine the durability of products when exposed to the marine environment and the physical disappearance of waste in case of dispersal.

This document describes a disintegration test performed in two different marine habitats under real field conditions. The relative durability of plastic materials of the same size and form may vary depending on the location of the exposure, seasonal variations, the climatic conditions, water movement, tides, availability of nutrients, and diversity and density of the competent microbial community. Hence, it is recommended to perform the disintegration test in regions where the plastic material is likely to end up in the coastal environment for accidental or deliberate reasons.

This document describes a disintegration test and not a biodegradation test, as the conversion of the plastic materials is not determined by means of measuring the O₂-consumption or the CO₂-evolution.

The assessment of the intrinsic aerobic biodegradability of plastic materials exposed to marine environment is covered by ISO 22403.

The determination of the degradation and durability of plastic materials floating on the surface of seawater or partially or completely immersed in coastal shallow seawater under real field conditions is covered by ISO 15314.

Plastics — Determination of the degree of disintegration of plastic materials in marine habitats under real field conditions

1 Scope

This document specifies test methods for the determination of the degree of disintegration of plastic materials exposed to marine habitats under real field conditions.

The marine areas under investigation are the sandy sublittoral and the sandy eulittoral zone where plastic materials can either be placed intentionally (e.g. biodegradable fishing nets) or end up as litter due to irresponsible human behaviour. This depends on their physical characteristics, form and size of the materials, and on water currents and tidal movements.

This document specifies the general requirements of the apparatus, and the procedures for using the test methods described.

The determination of the level of disintegration of plastic materials exposed to pelagic zones such as the sea surface or the water column above the seafloor are not within the scope of this document.

This document is not suitable for the assessment of disintegration caused by heat or light exposure.

The described field test is a disintegration test and not a biodegradation test. Therefore, it cannot be used for demonstrating biodegradation or for making unqualified claims such as “biodegradable in marine environment” and similar.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate*

ISO 4591, *Plastics — Film and sheeting — Determination of average thickness of a sample, and average thickness and yield of a roll, by gravimetric techniques (gravimetric thickness)*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

ISO 5667-3, *Water quality — Sampling — Part 3: Preservation and handling of water samples*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ASTM E11, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>