



# SLOVENSKI STANDARD SIST EN ISO 846:1999

01-maj-1999

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## Polimerni materiali - Vrednotenje delovanja mikroorganizmov (ISO 846:1997)

Plastics - Evaluation of the action of microorganisms (ISO 846:1997)

Kunststoffe - Bestimmung der Einwirkung von Mikroorganismen auf Kunststoffe (ISO 846:1997)

Plastiques - Evaluation de l'action des micro-organismes (ISO 846:1997)

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Ta slovenski standard je istoveten z: **EN ISO 846:1997**

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### **ICS:**

07.100.99	Drugi standardi v zvezi z mikrobiologijo	Other standards related to microbiology
83.080.01	Polimerni materiali na splošno	Plastics in general

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EUROPEAN STANDARD

EN ISO 846

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English version

**Plastics - Evaluation of the action of  
microorganisms (ISO 846:1997)**Plastiques - Evaluation de l'action des  
micro-organismes (ISO 846:1997)**STANDARD PREVIEW**  
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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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**CEN**European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

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EN ISO 846:1997

### Foreword

The text of the International Standard ISO 846:1997 has been prepared by Technical Committee ISO/TC 61 "Plastics" in collaboration with Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN.

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of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.

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

### Endorsement notice

The text of the International Standard ISO 846:1997 was approved by CEN as a European Standard without any modification.

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# INTERNATIONAL STANDARD

**ISO  
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## Plastics — Evaluation of the action of microorganisms

*Plastiques — Évaluation de l'action des micro-organismes*

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## ISO 846:1997(E)

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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International Standard ISO 846 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance*.

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<https://standards.iteh.ai/catalog/standards/sist/en-iso-846-1999> This second edition cancels and replaces the first edition (ISO 846:1978), which has been technically revised.

The Plastics Project Group of the IBRG (International Biodeterioration Research Group) carried out several interlaboratory tests between 1984 and 1990, using the 1978 edition of this standard, with the aim of checking the reproducibility of the test results. The experience gained from these tests has been incorporated in the present edition. In addition, a soil-burial test method has been included in subclause 8.5, based on a specification the Eidgenössische Materialprüfungsanstalt in St. Gallen, Switzerland.

Annex A forms an integral part of this International Standard. Annexes B and C are for information only.

## Introduction

Under certain climatic and environmental conditions, microorganisms may settle on and colonize the surface of plastics or plastics products. Their presence and/or their metabolic products may not only damage the plastic itself, but may also affect the serviceability of building materials and systems containing plastic parts.

The tests and test conditions specified in this International Standard are empirical and cover most- but not all- potential applications.

For specific applications and for long-term tests, procedures should be agreed upon which reflect performance under actual conditions.

The actions of microorganisms on plastics are influenced by two different processes:

- a) direct action: the deterioration of plastics which serve as a nutritive substance for the growth of the microorganisms;
- b) indirect action: the influence of metabolic products of the microorganisms, e.g. discolouration or further deterioration.

This International Standard deals with both of these two processes, as well as their combined action.

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# Plastics — Evaluation of the action of microorganisms

**WARNING** — Handling and manipulation of microorganisms which are potentially hazardous requires a high degree of technical competence and may be subject to current national legislation and regulations. Only personnel trained in microbiological techniques should carry out such tests. Codes of practice for disinfection, sterilization and personal hygiene must be strictly observed.

It is recommended that workers consult IEC 68-2-10:1988, appendix A “Danger to personnel”, and ISO 7218:1996, *Microbiology of food and animal feeding stuffs — General rules for microbiological examinations*.

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### 1 Scope

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This International Standard specifies methods for determining the deterioration of plastics due to the action of fungi and bacteria and soil microorganisms. The aim is not to determine the biodegradability of plastics.

The type and extent of deterioration may be determined by

a) visual examination

and/or

b) changes in mass

and/or

c) changes in other physical properties.

The tests are applicable to all articles made of plastic that have an even surface and that can thus be easily cleaned. The exceptions are porous materials, such as plastic foams.

This International Standard uses the same test fungi as IEC 68-2-10. The IEC method, which uses so-called “assembled specimens”, calls for inoculation of the specimens with a spore suspension, incubation of the inoculated specimens and assessment of the fungal growth as well as any physical attack on the specimens.

The volume of testing and the test strains used will depend on the application envisaged for the plastic. These parameters should therefore be agreed upon before the tests and should be stated in the test report.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 291:—1), *Plastics — Standard atmospheres for conditioning and testing*.

IEC 68-2-10:1988, *Basic environmental testing procedures — Part 2: Tests — Test J and guidance: Mould growth*.

## 3 Definitions

For the purposes of this International Standard, the following definitions apply:

**3.1 biodeterioration:** A change in the chemical or physical properties of a material due to the action of a microorganism.

**3.2 fungistatic effect:** The antimycotic effect of an antimicrobial treatment which prevents a given material from being overgrown by fungi under moist conditions.

**3.3 biodegradation:** The term "*biodegradation*" is being discussed by TC 61/SC 5/WG 22, *Biodegradability*, and the official definition will be included here when it is available.

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## 4 Principle

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**4.1** The test involves exposing test specimens of plastic to the action of selected test strains of fungi and bacteria (or, in the case of the soil-burial test, to microbially active soil) for specified or agreed periods of time under specified conditions of temperature and humidity.

At the end of the exposure, the test specimens are assessed before and/or after cleaning by visual examination and/or any change in mass or other physical properties is determined.

The results obtained with the specimens exposed to biological attack (batch I) are compared with those obtained from untreated specimens (batch O) or sterile specimens (batch S) kept under the same conditions.

**4.2** Short descriptions of the test methods used to determine the resistance of plastics to fungi (method A) or the fungistatic effects (methods B and B'), resistance to bacteria (method C) and resistance to soil microorganisms (method D) are given below.

### 4.2.1 Resistance to fungi

#### 4.2.1.1 Method A: Fungal-growth test

Test specimens are exposed to a mixed suspension of fungus spores in the presence of an incomplete nutritive medium (without a carbon source). The fungi can only grow at the expense of the material. If the specimens contain no nutritive component, the fungi cannot develop mycelia and there is no deterioration of the plastic.

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1) To be published. (Revision of ISO 291:1977)

Method A is suitable for the assessment of the inherent resistance of plastics to fungal attack in the absence of other organic matter.

It is recommended that, when method A is carried out, methods B and B' are also carried out to assist in the interpretation of the results.

#### 4.2.1.2 Methods B and B': Determination of fungistatic effects

Test specimens are exposed to a mixed suspension of fungus spores in the presence of a complete medium, i.e. with a carbon source. Even if the plastic does not contain any nutritive elements, the fungi can grow over the specimens and their metabolic products can attack the material.

Any inhibition of the growth either on the plastic or in the growth medium (zone of inhibition) shows fungistatic activity of the plastic or the presence of a fungicidal treatment.

In method B', the specimens are not placed on the nutritive medium until it is completely overgrown.

Methods B and B' are used when surface contamination is expected. In order to save time, and for a better understanding of the phenomenon, it is recommended that the two methods are carried out simultaneously.

#### 4.2.2 Method C: Resistance to bacteria

The action of bacteria on test specimens is assessed using an incomplete medium. If there is no growth in the agar round the specimen, then the specimen does not contain any nutritive components.

#### 4.2.3 Method D: Resistance to microbially active soil (soil-burial test)

Test specimens are completely buried in natural soil with a known water-holding capacity and a specified moisture content (see annex A).

The soil-burial test has been included in this International Standard because many plastics are used in permanent contact with soil and exposed to high humidities.

### 4.3 Choice of properties for assessment of biodeterioration

The choice of the properties to be determined depends on the aim of the test. A visual assessment of biological attack should preferably always be made as the first stage in assessing the resistance of the plastic.

The measurement of changes in mass is recommended, especially for those plastics that contain biologically degradable substances, such as plasticizers, lubricants and stabilizers (as in plasticized PVC, for instance). The measured loss is, in this case, often lower than the actual loss as the biologically degradable substance is only partly utilized and the metabolic products often remain in the plastic.

When, above all, the surface is affected, it is recommended that determinations be made of those properties which clearly indicate surface changes, such as surface gloss, flexural properties, impact resistance and hardness.

## 5 Apparatus and materials

### 5.1 For all tests

#### 5.1.1 Incubators

That used for tests involving fungal and bacterial attack shall be capable of controlling the temperature to  $\pm 1$  °C at any temperature from 20 °C to 35 °C at a relative humidity of 90 % or greater.

That used for soil-burial tests shall be capable of controlling the temperature to  $\pm 1$  °C at 29 °C at a relative humidity of 95% or greater.

NOTE — Experience has shown that it is preferable to use two incubators: one for Petri dish tests and another for soil-burial tests.

**5.1.2 Oven**, capable of controlling the temperature at 45 °C for drying test specimens and at between 103 °C and 105 °C for determining the water-holding capacity of soil.

**5.1.3 Desiccator**, capable of maintaining standard temperature and humidity conditions (23 °C and 50 % R.H.) for the conditioning of test and control specimens.

**5.1.4 Autoclave**, capable of maintaining a temperature and pressure of 120 °C and 2 bar, respectively, for sterilizing Petri dishes and soil.

**5.1.5 Analytical balance**, accurate to 0,1 mg.

**5.1.6 Laboratory centrifuge**.

**5.1.7 Stereoscopic microscope**, magnification  $\times 50$ .

**5.1.8 Glass or plastic disposable Petri dishes**, of suitable size for exposing test specimens.

**5.1.9 Glass containers**, with a volume of about 1 litre (height 16 cm; diameter 11 cm), for example preserving jars with covers.

**5.1.10 Distilled or deionized water**.

The water used for the preparation of all solutions and nutritive media and for all determinations shall be distilled or deionized and have a conductivity of  $< 1$   $\mu\text{S}/\text{cm}$ .

**5.1.11 Microbicidal solutions:**

**5.1.11.1 Ethanol-water mixture**, in the proportions, by mass, of 70:30.

**5.1.11.2 *o*-Phenylphenol**.

Dissolve 1 g of *o*-phenylphenol in 50 ml of 90 % ethanol, make up to 1 000 ml with water and adjust the pH to 3,5 by adding lactic acid drop by drop.

The microbicidal solution used shall be stated in the test report.

**5.2 For tests with fungi**

**5.2.1 Test fungi**.

The test fungi shall be obtained from national culture collections. The strains to be used are listed in table 1, and be stated in the test report.