



SLOVENSKI STANDARD
oSIST prEN ISO 17616:2022
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Kakovost tal - Navodilo za izbiro in vrednotenje bioloških preskusov za ekotoksikološko karakterizacijo tal in talnih materialov (ISO 17616:2019)

Soil quality - Guidance on the choice and evaluation of bioassays for ecotoxicological characterization of soils and soil materials (ISO 17616:2019)

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Qualité du sol - Lignes directrices relatives aux choix et à l'évaluation des essais appliqués pour la caractérisation écotoxicologique des sols et des matériaux de type sol (ISO 17616:2019)

Ta slovenski standard je istoveten z: prEN ISO 17616

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13.080.05	Preiskava tal na splošno	Examination of soils in general
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STANDARD

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17616

Second edition
2019-10

**Soil quality — Guidance on the choice
and evaluation of bioassays for
ecotoxicological characterization of
soils and soil materials**

*Qualité du sol — Lignes directrices relatives aux choix et
à l'évaluation des essais appliqués pour la caractérisation
écotoxicologique des sols et des matériaux de type sol*

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ISO 17616:2019(E)

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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 4, *Biological characterization*.

This second edition cancels and replaces the first edition (ISO 17616:2008), which has been technically revised. The main changes compared to the previous edition are as follows:

- definitions for “soil use” and “ecosystem service” ^[10] have been added to [Clause 3](#);
- end points of ecotoxicity tests (e.g. mortality, reproduction, growth, genotoxicity, and other functional activities), as well as the overall principles and application of test batteries have been clarified in [Clause 4](#);
- sub-chronic toxicity tests have been added;
- [Figure 1](#) was revised;
- [Tables 1](#) and [2](#) (test batteries for retention and habitat function assessment, respectively) have been revised (test categories, test organisms added/deleted, references updated).

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

The characterization of contaminated soils can be based on strategies considering chemical analyses and/or bioassays. ISO 15799 provides guidance on the selection of experimental methods for the assessment of the ecotoxic potential of soils and soil materials (e.g. excavated and remediated soils, refills, embankments) with respect to their intended use or re-use, and possible adverse effects on aquatic and soil dwelling organisms.

An assessment strategy giving instructions for the choice and evaluation of test results is hence proposed. The evaluation of the bioassays outcome is based on empirically-derived critical dilution levels that take into account the sensitivity of the test system and the intended use/re-use of the site under investigation. This approach intends to contribute to an effective and comparable assessment within the ecotoxicological characterization of contaminated soil or soil materials^[1]. The test systems included in this approach are not mandatory and may be replaced or accomplished by other test methods. Nevertheless, the selected test systems have proved to appropriately characterize contaminated soils and soil materials with respect to their ecotoxic properties^{[2],[3]}, both towards aquatic and terrestrial organisms, the latter being responsible for maintaining essential soil functions.

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Soil quality — Guidance on the choice and evaluation of bioassays for ecotoxicological characterization of soils and soil materials

1 Scope

This document is one of the family of standards (ISO 15799, ISO 19204) providing guidance on the characterization of soils and soil materials in relation to their retention and habitat functions and uses. It is appropriate to use it in conjunction with the two other standards in this family. It provides guidance on the choice and evaluation of tests applied for ecotoxicological characterization of soils and soil materials. Recommendations for test strategies with respect to the protection of ground and surface waters and the maintenance of the habitat function of soil are included. The tests recommended represent a minimum test battery that can be complemented by additional tests, or even be replaced by others, according to the intended uses or protection goals envisaged. The effect values indicated in this document do not refer to regulation but represent the lowest level at which an adverse effect is considered likely to occur.

2 Normative references

There are no normative references in this document.

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/>

3.1 Assessment

3.1.1

soil-related assessment

assessment of the ecotoxic potential of *soils* (3.2.1), soil substrates and *soil materials* (3.2.2) based on chemical analyses, biological tests and field inventories (monitoring) such as that mentioned in the TRIAD approach^[4]

Note 1 to entry: TRIAD means an assessment approach based on a combination of chemical (i.e. residue analysis), ecotoxicological (i.e. laboratory ecotoxic tests) and ecological (i.e. monitoring) data.

3.1.2

risk

expression of the probability that an adverse effect on *soil* (3.2.1) functions will occur under defined conditions and the magnitude of the consequences of the effect occurring

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3.1.3

LID-value

lowest-ineffective-dilution value

lowest value of the dilution factor above which the test gives an ecotoxicological relevant reduction (e.g. 20 % inhibition of luminescence)

EXAMPLE A LID 8 corresponds to a dilution of soil extract of 1 : 8 (i.e 1 part of soil extract: 7 parts of dilution water).

Note 1 to entry: The exact definitions are given in the standard of the respective bioassay. According to ISO 13829^[5] for the umu-test, it is the "DLi value" (explanation in Annex D). According to ISO 16240^[6] 3.4, it is the "decisive D_{\min} value".

Note 2 to entry: For further information on results expression and interpretation based on LID values see [Annex A](#) of this document.

3.2 Types of soil and other soil materials

3.2.1

soil

upper layer of the Earth's crust composed of mineral particles, organic matter, water, air and organisms

[SOURCE: ISO 15799:2019, 3.1.1]

3.2.2

soil material

material coming from *soil* (3.2.1) and displaced and/or modified by human activity, including excavated soil, dredged materials, manufactured soils, remediated treated soils or fill materials

[SOURCE: ISO 17402:2008, 3.16]

3.3 Terms relating to Soil characteristics

3.3.1

habitat function

ability of *soils* (3.2.1)/ *soil materials* (3.2.2) to serve as a habitat for microorganisms, plants, soil-living animals and their interactions (i.e. biocenose)

[SOURCE: ISO 15799:2019, 3.2.1]

3.3.2

retention function

ability of *soils* (3.2.1)/ *soil materials* (3.2.2) to adsorb pollutants in such a way that they cannot be mobilised via the water pathway and translocated into the food chain

Note 1 to entry: The habitat and retention functions include the following soil functions according to ISO 11074:2015^[7], 3.3.31:

- control of substance and energy cycles as components of ecosystems;
- basis for the life of plants, animals and man;
- carrier of genetic reservoir;
- basis for the production of agricultural products;
- buffer inhibiting movement of water, contaminants or other agents into the ground water.

[SOURCE: ISO 15799:2019, 3.2.2]

3.3.3**contaminant**

substance or agent present in the *soil* (3.2.1) as a result of human activity

Note 1 to entry: There is no assumption in this definition that harm results from the presence of the contaminant.

Note 2 to entry: See also pollutant (3.2.3) and potentially harmful substance (3.2.5) definitions in ISO 15799:2019

[SOURCE: ISO 15176:2002^[9], 3.2.6, modified — Note 2 to entry added.]

3.3.4**pollutant**

substances, which due to their properties, amount or concentration cause negative impacts on the *soil* (3.2.1) function or soil use

Note 1 to entry: Adapted from ISO 15176:2002^[9] 3.2.7.

3.4 Land and sites**3.4.1****re-use**

useful and harmless utilisation of *soil materials* (3.2.2)

Note 1 to entry: In the context of this document re-use means the transfer of soil materials to another location for use in agriculture, horticulture, forestry, gardens, recreational areas and construction sites.

[SOURCE: ISO 15176:2002^[9], 3.4.1; ISO 15799:2019, 3.3.1]

3.4.2**soil use**

use of the *ecosystem services* (3.4.3) that *soil* (3.2.1) provides

3.4.3**ecosystem service**

service that is (directly or indirectly) provided by an ecosystem to benefit people

[SOURCE: Based on Millennium Ecosystem Assessment]

4 Principles and applications of test batteries

The sensitivity of organisms (e.g. bacteria, plants, animals) to toxicants may vary significantly from one species to another. Thereby, it is admitted that only the results of several ecotoxicity tests can give a clear indication of the toxic effects of soil or soil materials. As such, the combination of ecotoxicity tests, defined as a battery, shall include organisms belonging to various trophic levels, several biological responses or end points (e.g. mortality, reproduction, growth, genotoxicity, as well as other functional activities), in order to take into account the variability of species sensitivity within the studied compartment.

The ecotoxicity tests included in batteries should at least have the following characteristics:

- sensitivity;
- practicability;
- compliance with standardized methods;
- high cost efficiency;
- representativeness of the soil ecosystem and/or of the selected application scenario (i.e. habitat or retention functions).