INTERNATIONAL STANDARD

ISO 17512-1

First edition
2008-12-15

Soil quality — Avoidance test for determining the quality of soils and effects of chemicals on behaviour —

Part 1: Test with earthworms (*Eisenia fetida* and *Eisenia andrei*)

Qualité du sol — Essai d'évitement pour contrôler la qualité des sols et les effets des produits chimiques sur le comportement —

*Partie 1: Essai avec des vers de terre (*Eisenia fetida *et* Eisenia andrei*)*

Reference number
ISO 17512-1:2008(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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

ISO 17512-1 was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 4, *Biological methods*.

ISO 17512 consists of the following parts, under the general title *Soil quality — Avoidance test for determining the quality of soils and effects of chemicals on behaviour*:

— *Part 1: Test with earthworms (*Eisenia fetida *and* Eisenia andrei*)*

The following part is under preparation:

— *Part 2: Test with collembolans (*Folsomia candida*)*

Introduction

Ecotoxicological test systems are applied to obtain information about the effects of contaminants in soil and are proposed to complement conventional chemical analysis (see ISO 15799). ISO 15799 includes a list and short characterisation of recommended and standardised test systems. Aquatic test systems with soil eluate are applied to obtain information about the fraction of contaminants potentially reaching the groundwater by the water path (retention function of soils), whereas terrestrial test systems are used to assess the habitat function of soils. As standardised test systems, a mortality test (ISO 11268-1) and a reproduction test (ISO 11268-2) exist to investigate the habitat function of a soil with respect to earthworms as representatives of the soil biocenosis.

The reproduction test with earthworms (ISO 11268-2) is applied to detect effects resulting from sublethal concentrations. Such endpoints are preferably applied to obtain information on environmental effects. However, the reproduction test is very labour-intensive and time-consuming, needing long incubation periods with results obtained only after 56 days. As the test period and the work expense dictate the costs of a given test, it is preferable to obtain the results within a short test period and at a high level of sensitivity. That is especially the case for the assessment of remediated soils. This feature is offered by the avoidance test with *Eisenia fetida* and *Eisenia andrei*. Experiences gained in a laboratory comparison test with eight contaminated soils in three laboratories point out that the avoidance test is as sensitive as the reproduction test (Reference [5]). However, it is not intended to use this test to replace the earthworm reproduction test.

NOTE The results were compared with those of the earthworm acute and reproduction tests carried out with the same soils. The results showed that with a criterion of > 80 % avoidance response, a 72 % agreement of the results was achieved.

Soil quality — Avoidance test for determining the quality of soils and effects of chemicals on behaviour —

Part 1: Test with earthworms (*Eisenia fetida* and *Eisenia andrei*)

1 Scope

This part of ISO 17512 specifies a rapid screening method for evaluating the habitat function of soils and the influence of contaminants and chemicals on earthworm behaviour.

The sublethal test is a rapid method that reflects the bioavailability of contaminant mixtures in natural soils and substances spiked into soils to *Eisenia fetida* and *Eisenia andrei.* The avoidance behaviour of the worms is the measurement endpoint of the test. This test is not intended to replace the earthworm reproduction test.

Two different designs (a two section unit and a six section unit) have been developed and successfully applied. Both designs are applicable to either single-concentration (e.g. for assessing the quality of a field soil) or multi-concentration (e.g. for assessing the toxicity of a spiked chemical) tests. In both cases, the earthworms are allowed to make the initial choice on which compartment, control and a treatment [in the two section test vessel between right and left side; in the six section test vessel between the (3 + 3) alternating compartments], to enter.

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 10390, *Soil quality — Determination of pH*

ISO 11268-2:1998, *Soil quality — Effects of pollutants on earthworms (*Eisenia fetida*) — Part 2: Determination of effects on reproduction*

ISO 11269-2, *Soil quality — Determination of the effects of pollutants on soil flora — Part 2: Effects of chemicals on the emergence and growth of higher plants*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

ISO 15799, *Soil quality — Guidance on the ecotoxicological characterization of soil and soil materials*