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Date: 06 August 2025

Origin: European

Latest date for receipt of comments: 29 September 2025

Project No. 2023/02562

Responsible committee: EH/4 Soil quality

Interested committees:

Title: Draft BS EN ISO 23611-6 Soil quality — Sampling of soil invertebrates. Part 6: Guidance for the design of sampling programmes with soil invertebrates.

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Introduction

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 23611-6

Soil quality — Sampling of soil invertebrates —

Part 6: Guidance for the design of sampling programmes with soil invertebrates

Qualité du sol — Prélèvement des invertébrés du sol —

*Partie 6: Lignes directrices pour la conception de programmes
d'échantillonnage des invertébrés du sol*

ICS: 13.080.30

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 23611-6:2025(en)

Full document details: 25/30482179 DC

ISO/TC 190/SC 4

Secretariat: **AFNOR**

Voting begins on:
2025-08-06

Voting terminates on:
2025-10-29

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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.

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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This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 4, *Biological characterization*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 444, *Environmental characterization of solid matrices*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 23611-6:2012), which has been technically revised.

The main changes are:

- addition of detailed recommendations about the statistical methods that shall be applied in site-specific risk assessment of contaminated land in [section 7.5](#)
- removal of the informative annex A with examples of case studies.

A list of all parts in the ISO 23611 series can be found on the ISO website.

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 biodiversity of soil fauna is tremendous. Soil harbours species-rich communities, which regulate ecosystem processes such as organic matter decomposition, nutrient flows or soil fertility in general, References [1], [2]. All terrestrial animal phyla can be found in soils, Reference [3]. In addition to thousands of bacterial and fungal “species”, more than 1 000 species of invertebrates in abundances of up to 1,5 million individuals can be found within a square metre of soil, References [4], [5]. This diversity can only be reliably estimated by investigation of the soil community itself, since other parameters like climate are not or only weakly correlated with species richness, Reference [6].

The composition of this community, as well as the abundance and biomass of the individual species and groups is a valuable source of information, since they integrate various abiotic and biotic effects such as soil properties and conditions, climate, competition or biogeographical influences, Reference [7]. For this reason, the evaluation of the biodiversity of soil invertebrate communities becomes more and more important for the classification and assessment of biological soil quality, Reference [8]. However, this work is only possible if data collection (i.e. sampling of the soil fauna) is carried out according to standardized methods. For this reason, a number of ISO guidelines have been prepared covering the sampling of the most important soil organism groups.

In the individual parts of ISO 23611, the practical work concerning the respective animal group is described in detail. However, (nearly) nothing is said about how to plan the use of such methods or how to evaluate the results. Despite the fact that sampling for any field study can be different depending on the individual purpose, guidance is needed for monitoring studies in a legal context. Such studies can include the following:

- site-specific risk assessment of contaminated land;
- study of potential side effects of anthropogenic impacts (e.g. the application of chemicals or the building of roads);
- the biological classification and assessment of soils in order to determine the biological quality of soils;
- long-term biogeographical monitoring in the context of nature protection or restoration, including global change [e.g. as in long-term ecological research projects (LTERs)].

Spatial studies focusing on environmental and ecological questions require a carefully designed strategy for collecting data. References [9], [10]. Before identifying the optimal design, two issues have to be clarified: what is the objective of the study and what is already known about the survey area? Afterwards, one may select one of the well-known design patterns (e.g. grid sampling, random sampling, clustered sampling or random transects) or prepare a study-specific design. In any case, the field sampling design has to be practical, e.g. the volume of soil to be sampled, depending on the size and distribution of the organisms, has to be manageable (i.e. the smaller the individual animal, the smaller the size), and cost effective.

In studies focusing on soil invertebrates, it is not possible to observe the entire population. Therefore, sampling is done only at a limited number of locations. The main reason for using statistical sound sampling schemes is that such sampling guarantees scientific objectivity and avoids forms of bias such as those caused by judgement sampling. This is especially valuable if the objective is to obtain data that are representative for the whole area. At the same time, statistics-based sampling schemes ensure standardized sampling methods over time, i.e. if the same area is to be re-sampled in the future, the results will be comparable.

The rationale for this guidance on the design of field sampling methods for soil invertebrates takes into consideration the guidance provided in ISO 10381-1 describing soil sampling in general.

The design of microbiological studies is already covered by ISO 10381-6, ISO 14240-1 and ISO 14240-2.

Soil quality — Sampling of soil invertebrates —

Part 6:

Guidance for the design of sampling programmes with soil invertebrates

1 Scope

This part of ISO 23611 provides guidance for the design of field studies with soil invertebrates (e.g. for the monitoring of the quality of a soil as a habitat for organisms). Detailed information on the sampling of the most important soil organisms is provided in the other parts of this International Standard (ISO 23611-1 to ISO 23611-5).

This part of ISO 23611 is used for all terrestrial biotopes in which soil invertebrates occur. Basic information on the design of field studies in general is already laid down in ISO 10381-1. This information can vary according to the national requirements or the climatic/regional conditions of the site to be sampled.

NOTE While this part of ISO 23611 aims to be applicable globally for all terrestrial sites that are inhabited by soil invertebrates, the existing information refers mostly to temperate regions. However, the (few) studies from other (tropical and boreal) regions, as well as theoretical considerations, allow the conclusion that the principles laid down in this part of ISO 23611 are generally valid, References [1], [11], [12], [13].

This part of ISO 23611 gives information on site-specific risk assessment of contaminated land, study of potential side effects of anthropogenic impacts (e.g. the application of chemicals or the building of roads), the biological classification and assessment of soils in order to determine the biological quality of soils, and long-term biogeographical monitoring in the context of nature protection or restoration, including global change (e.g. as in long-term ecological research projects).

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 10390, *Soil, treated biowaste and sludge – Determination of pH*

ISO 10694, *Soil quality — Determination of organic and total carbon after dry combustion (elementary analysis)*

ISO 11074, *Soil quality — Vocabulary*

ISO 11260, *Soil quality — Determination of effective cation exchange capacity and base saturation level using barium chloride solution*

ISO 11272, *Soil quality — Determination of dry bulk density*

ISO 11274, *Soil quality — Determination of the water-retention characteristic — Laboratory methods*

ISO 11277, *Soil quality — Determination of particle size distribution in mineral soil material — Method by sieving and sedimentation*

ISO 11461, *Soil quality — Determination of soil water content as a volume fraction using coring sleeves — Gravimetric method*

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