INTERNATIONAL STANDARD

ISO 18400-206

First edition
2018-10

Soil quality — Sampling —

Part 206: Collection, handling and storage of soil under aerobic conditions for the assessment of microbiological processes, biomass and diversity in the laboratory

Qualité du sol — Échantillonnage —

Partie 206: Collecte, manipulation et conservation de sols destinés à l'évaluation de paramètres biologiques fonctionnels et structurels en laboratoire

Reference number
ISO 18400-206:2018(E)

© ISO 2018



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

 © ISO 2018 – All rights reserved

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Procedure for the handling of soil samples to be used in laboratory tests with microorganisms, plants and invertebrates **2**
4.1 Selection of sampling locations 2
4.2 Performance of a preliminary survey 2
4.3 Description of field site 3
4.4 Sampling conditions 3
4.5 Sampling methods 3
4.6 Sample marking 3
4.7 Transportation conditions 3
4.8 Soil processing in the laboratory 3
4.9 Storage conditions and storage periods 4
4.10 Pre-incubation 6
5 Sampling report **6**
Bibliography **8**

© ISO 2018 – All rights reserved

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 first edition of ISO 18400-206 cancels and replaces ISO 10381-6:2009, which has been technically revised.

A list of all the parts in the ISO 18400 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.

© ISO 2018 – All rights reserved

Introduction

Soils are both complex and heterogeneous because they consist of both living and non-living components occurring in different combinations. Therefore, the condition of the soil, from collection to completion of an experiment, is considered in this document in relation to effects on the soil organism community (i.e. microorganisms, plants and invertebrates). Temperature, water content, availability of oxygen and duration of storage are all known to affect these organisms, and thus the processes they mediate.

Soils can however be used effectively in the laboratory to investigate effects on soil organisms. In this context a distinction is made between microbial communities on the one side and plants and invertebrates on the other side, since the former are sampled as part of a soil sample, while the latter are added to a soil sample (usually only a few selected species which have been identified as test species beforehand). Therefore, this document covers two different issues:

a) It provides guidance on the collection, handling and storage of soil for laboratory use where aerobic microbial activity is the main component of the study. It describes how to minimize the effects of differences in temperature, water content and availability of oxygen on aerobic processes to facilitate reproducible laboratory determinations[1][2].

b) It also provides guidance on the collection, handling and storage of soil for laboratory use where the survival, reproduction, behaviour or growth of invertebrates or plants is the main components of the study. It describes how to minimize the effects of differences in temperature, and the water content as well as the fractionation of soil particles to facilitate reproducible laboratory determinations[1][2].

This document is one of a group of standards dealing with various aspects of site investigation and sampling. It needs to be used in conjunction with the other parts of ISO 18400. The role/position of the standards within the total investigation programme is shown in Figure 1.

© ISO 2018 – All rights reserved

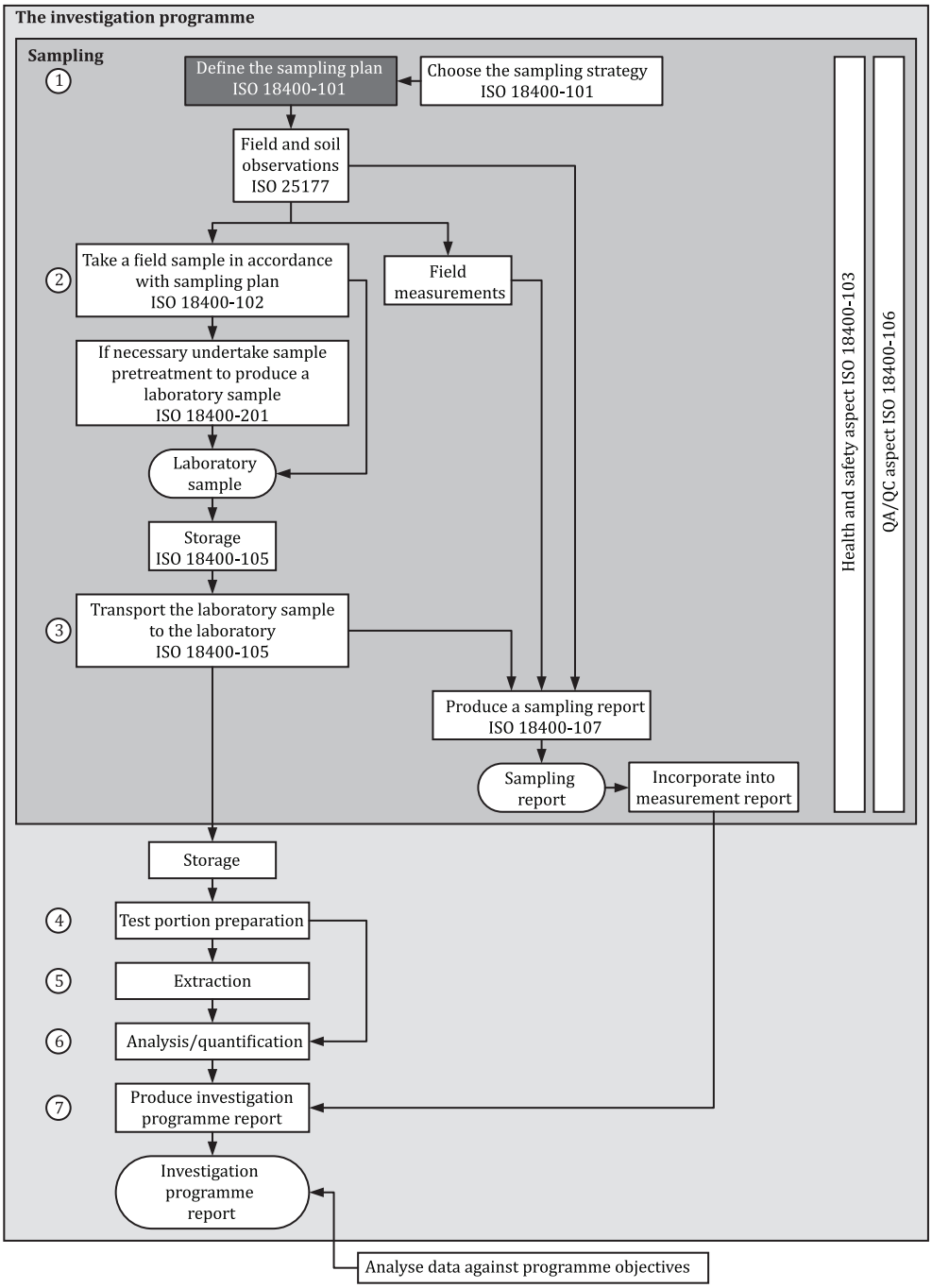


Figure 1 — Links between the essential elements of an investigation programme

NOTE 1 The numbers in circles in Figure 1 define the single steps of the investigation programme.

NOTE 2 Figure 1 displays a generic process which can be amended when necessary.

© ISO 2018 – All rights reserved

Soil quality — Sampling —

Part 206: Collection, handling and storage of soil under aerobic conditions for the assessment of microbiological processes, biomass and diversity in the laboratory

1 Scope

This document provides standard procedures for the collection, handling and storage of soil for subsequent biological testing under aerobic conditions in the laboratory. It applies to the collection, handling and storage for assessing the effects of soil on microorganisms, invertebrates (e.g. survival, reproduction, growth, behaviour) and plants (e.g. development, growth). This document is not applicable to the handling of soil where anaerobic conditions need to be maintained throughout.

This document describes how to minimize the effects of differences in temperature, water content, and availability of oxygen on aerobic processes as well as the fractionation of soil particles to facilitate reproducible laboratory determinations[1][2].

This document is mainly applicable to temperate soils. Soils collected from extreme climates (e.g. permafrost, tropical soils) can require special handling.

NOTE This document does not provide standard procedures on the collection, handling and storage of soil organisms when assessing the structure and function of soil organism communities in the field. Such standard procedures are provided in ISO 23611-1 to ISO 23611-6.

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 18400-101, *Soil quality — Sampling — Part 101: Framework for the preparation and application of a sampling plan*

ISO 18400-107, *Soil quality — Sampling — Part 107: Recording and reporting*

ISO 18400-202, *Soil quality — Sampling — Part 202: Preliminary investigations*

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
aerobic
descriptive of a condition in which molecular oxygen is freely available

© ISO 2018 – All rights reserved

3.2
anaerobic
descriptive of a condition in which molecular oxygen is not available

3.3
water content on a dry mass basis
mass of water evaporating from the soil when dried to constant mass at 105 °C divided by the dry mass of the soil and multiplied by 100

[SOURCE: ISO 11465:1993, 3.2]

4 Procedure for the handling of soil samples to be used in laboratory tests with microorganisms, plants and invertebrates

4.1 Selection of sampling locations

The locations of the sites from which samples are taken should be selected according to the purpose of the study, preliminary information, and on-site conditions. Sampling locations should be representative of the total area to be sampled. These locations should be preferably geo-referenced. Sampling patterns can be based on statistical models, numerical random distributions or systematic patterns as described in ISO 18400-104. For details on the selection of sampling locations for sampling programmes with soil invertebrates see also Reference [3].

NOTE It can be helpful to estimate the uncertainty of the measurement when soil sampling. Appropriate statistical methods depend on the purpose and the design of the sampling (see ISO 18400-104).

Examples of on-site conditions that shall be considered when designing a sampling strategy include local topography, climatic conditions, vegetation cover (especially trees), soil type and/or soil physicochemical characteristics and, if appropriate, the location of a contaminant source (point or non-point) or the direction of contamination. Soil properties as well as soil contamination are often characterized by high variability in time and space. Thus, different designs and statistical methods shall apply depending on the respective study objective.

Depending on the objective of the investigation a sampling pattern is chosen when designing the study and is then applied in the field. Afterwards, preparation of the site includes the establishment of safety measures (see also ISO 18400-103). When sampling if practicable, the locations should be marked so that they can be used for comparative tests or to obtain further samples (e.g. at a later date). This work becomes very time consuming if it is not possible to take a sample at the planned location due to a variety of reasons (e.g. trees, rocks, or access difficulties). Contingency plans for dealing with such situations should be made in advance (ad hoc decisions in the field can lead to a bias). The action taken depends on the circumstances: the point can be ignored, or a nearby substitute location (e.g. within 10 % of grid spacing away from the original location) can be chosen. In every case when a sampling point is re-located, this should be done in accordance with ISO 18400-101 and the reason for relocation shall be clearly indicated in the report.

4.2 Performance of a preliminary survey

A preliminary investigation in accordance with ISO 18400-202 should be carried out prior to any sampling programme, although the effort devoted to it depends on the objective of the investigation. It should always comprise a desk-top study and a site visit. In addition, in the specific context of this International Standard, a limited amount of sampling can be carried out provided that it is safe to do so. The principal objectives of the preliminary study are to gain knowledge about the present condition of the site, and of past activities on the site and adjacent land which can have affected it in order to enable the sampling programme to be designed to be both technically effective and cost effective. In addition, measures shall be identified that protect the health and safety of the investigating personnel and of the environment (see ISO 18400-103).

© ISO 2018 – All rights reserved