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Kakovost tal - Vzorčenje - 103. del: Varnost

Soil quality - Sampling - Part 103: Safety

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Qualité du sol - Échantillonnage - Partie 103: Sécurité
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ICS:

13.080.05	Preiskava tal na splošno	Examination of soils in general
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STANDARD

ISO
18400-103

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2017-01

**Soil quality — Sampling —
Part 103:
Safety**

*Qualité du sol — Échantillonnage —
Partie 103: Sécurité*

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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Preliminary considerations	1
5 Concepts and processes	3
5.1 General.....	3
5.2 Risk assessment.....	3
5.3 Risk management.....	4
5.4 Identifying hazards.....	5
6 Safety precautions — General aspects	5
6.1 Safety policy.....	5
6.2 Planning and managing for safety.....	6
6.3 Personnel.....	7
6.4 Safety equipment.....	7
7 Safety precautions in relation to particular hazards	11
7.1 General.....	11
7.2 Personal protective equipment.....	11
7.3 Chemicals.....	11
7.4 Gases.....	12
7.5 Biological hazards (bacteria and viruses).....	13
7.6 Radiation.....	13
7.7 Asbestos.....	13
7.8 Topography.....	13
7.9 Machines.....	14
7.10 Buildings and other structures.....	15
7.11 Unexploded ordnance and other explosive hazards.....	15
7.12 Extreme weather conditions.....	16
8 Safety procedures — Specific activities	16
8.1 General.....	16
8.2 Protection of buildings and installations including underground utilities.....	16
8.3 Safety on agricultural sites (see also 6.4 and B.2).....	17
8.4 Safety on contaminated sites (see also 6.4 and B.3).....	17
8.4.1 Preliminary investigation and site reconnaissance.....	17
8.4.2 Field investigations — General.....	18
8.4.3 Field investigations — Soil gas.....	18
Annex A (informative) Routes of exposure to hazard	20
Annex B (informative) Potential on-site hazard relating to sampling and the area of investigation	22
Annex C (informative) Example of risk assessment	29
Bibliography	30

ISO 18400-103:2017(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).

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 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 2, *Sampling*.

This first edition of ISO 18400-103 cancels and replaces ISO 10381-3:2001, which has been technically and structurally revised. The ISO 18400 series is based on a modular structure and cannot be compared to ISO 10381-3 clause by clause.

A list of all parts in the ISO 18400 series can be found on the ISO website.

Introduction

This document is one of a group of International Standards intended to be used in conjunction with each other where necessary (the role/position of the International Standards within the total Investigation programme is shown in [Figure 1](#)).

It deals with safety during sampling and other soil investigation activities. International and national regulations regarding health and safety at work and associated guidance produced by statutory bodies and trade associations could exist and may need to be taken into account.

It does not seek to address everyday hazards that could arise from the use of such items as sharp instruments, digging/drilling equipment, nor the hazards of driving to a site location. It is assumed that such hazards are satisfactorily dealt with by the personnel carrying out the investigation and the sampling.

Former production sites for munitions and other warfare agents present special problems to investigators and others involved in handling samples collected at such locations. The guidance given in this document will be of assistance in these situations, but additional guidance about the precautions to be taken should be obtained from specialists, such as those responsible for the former operation of these sites.

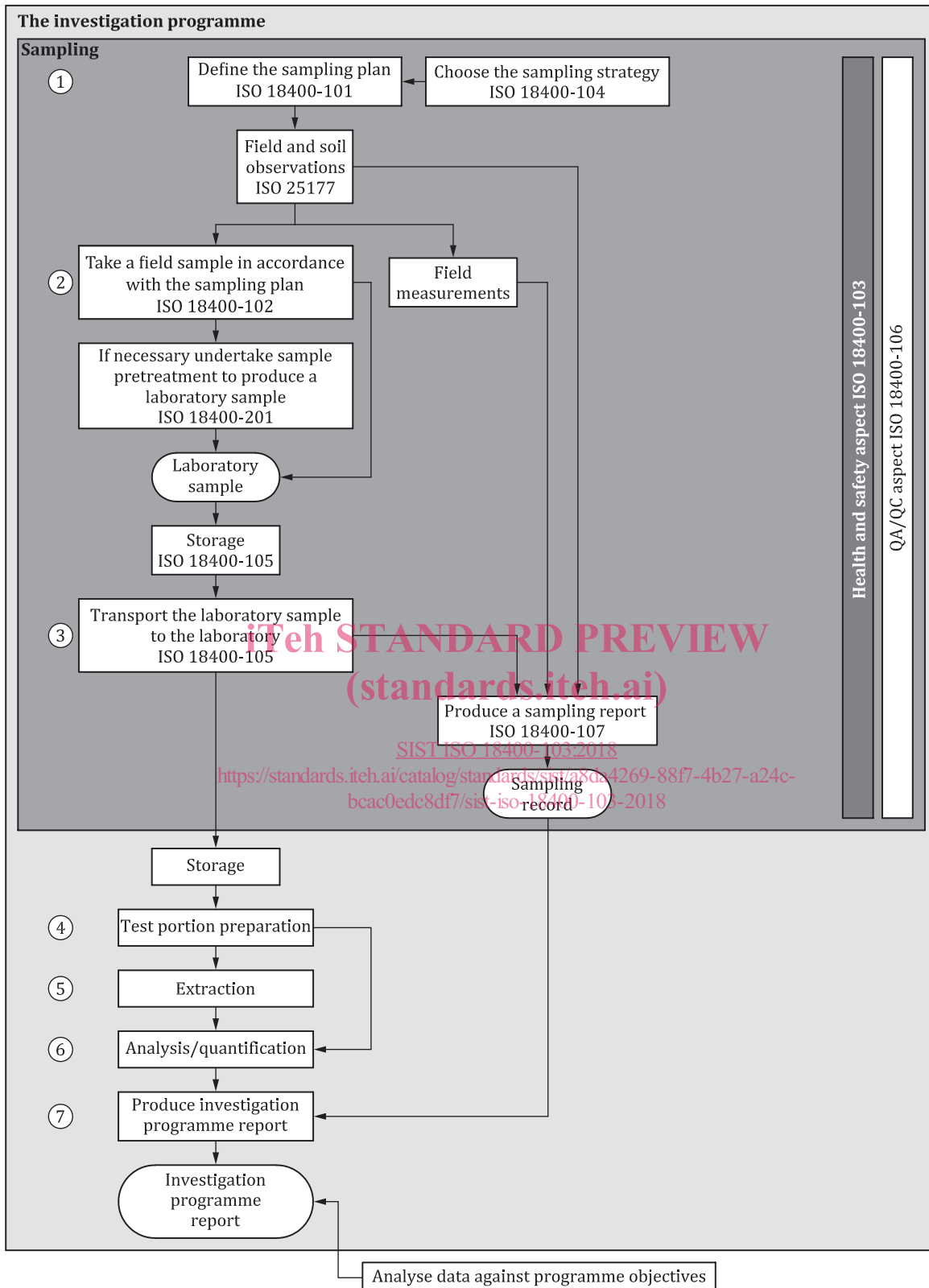
Geological and geotechnical investigations are outside of the scope of this document and for detailed guidance, reference is to be made to other relevant International Standards. However, soil quality investigations may sometimes be combined with geotechnical investigations for practical reasons and for economy and thus specific hazards and risks associated with geotechnical investigations might need to be addressed in the overall risk assessment.

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ISO 18400-103:2017(E)



NOTE 1 The numbers in circles in [Figure 1](#) define the key elements (1 to 7) of the investigation programme.

NOTE 2 [Figure 1](#) displays a generic process which can be amended when necessary.

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

Soil quality — Sampling —

Part 103: Safety

1 Scope

This document gives guidelines for:

- identification of hazards that could be encountered during a site investigation and when collecting samples of soil and other ground material, including hazards that are intrinsic in the sampling operation (e.g. physical hazards) in addition to the hazards that might arise, e.g. from contamination with chemicals or biological agents;
- measures to be adopted to control risks once an appropriate risk assessment has been carried out.

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 11074, *Soil quality — Vocabulary*

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3 Terms and definitions

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For the purposes of this document, the terms and definitions given in ISO 11074 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Preliminary considerations

The main objectives of this guidance on safety are to:

- a) identify the hazards that could exist when carrying out site investigations and soil sampling programmes,
- b) indicate management procedures to provide a framework for safe working,
- c) indicate what working procedures can be adopted to minimize risks from contaminants, physical and other hazards associated with the collection of samples and the use of machinery, and
- d) indicate what precautions can be taken in terms of personal protection and cleaning facilities to minimize any risks.

It is not possible, in a guidance document such as this, to identify all the hazards that could be encountered during site work, or to provide guidance on how the associated risks can be dealt with in all situations. Safety depends ultimately on the adoption of an attitude and approach to any particular

ISO 18400-103:2017(E)

situation that will ensure that the hazards are identified and properly evaluated and appropriate precautions taken.

Those authorizing, purchasing, designing and supervising works, the employers, and those carrying out the work have a joint responsibility for safety. This responsibility extends beyond protection of the workforce to include the general public who are living or working close to the site to be investigated, or who might enter the site, with or without permission, while the works are in progress.

In all daily activities, there is an element of risk and this risk is increased when the environment is unfamiliar. Even sampling an agricultural area involves an increased risk to the sampler because the nature of the ground and possible hazards are not necessarily known to the sampler.

When examining a site for contamination, the risks are increased due to the presence of chemicals, compounds and agents which present a hazard to human health. When examining a former industrial site, the risk of physical injury can be increased because of the possibility of voids and cavities (physical hazards) beneath ground level which might not have been properly filled in. Cavities can also be present where there has been underground combustion (for example, in refuse sites and colliery waste disposal sites).

Physical injury is also possible in any sampling situation where machinery is being used. Even minor injuries can provide a pathway for toxic substances and pathogens to enter the body.

Care should be taken to ensure the safety of the investigator when a preliminary site visit (site reconnaissance) is carried out prior to commencing the full site investigation, particularly as all potential hazards might not have been identified at that time.

At most active construction and industrial sites, special safety instructions are in effect. In addition, regulations could exist and may need to be taken into account on site. When relevant, the sampler should be informed before entering the site.

If during the site reconnaissance carried out as part of a preliminary investigation anything is seen that is considered likely to pose an immediate threat to human health and safety or the environment, this should be reported immediately to whoever is in control of the site so that any essential urgent action can be taken.

NOTE 1 There might be a duty under health and safety legislation and/or a professional code of conduct to do this.

When the site surface prior to the investigation is obviously contaminated, or presents a general environmental problem due to exposure of humans or animals, and there is the possibility of dispersal of contaminated dust or water pollution, in addition to taking precautions to minimize disturbance and dispersal of contamination during the site investigation, the situation should be brought to the attention of the landowner and authorities as appropriate, so that preventative measures can be implemented.

In addition to the guidance provided in this document, guidance can be found in:

- international and national legislation and associated guidance;
- industry codes of practice;
- safety documentation produced by employing companies and other organisations;
- site-specific safety instructions.

Some guidance document that might be relevant are listed in the Bibliography.

BS OHSAS 18001^[2] specifies requirements for an occupational health and safety management system to enable an organization to control its occupational health and safety risks and improve its occupational health and safety performance. Guidelines for its implementation are provided in BS OHSAS 18002^[8]. BS OHSAS 18001^[2] is designed to be compatible with ISO 9001^[2] (Quality) and ISO 14001^[3]

(Environmental) management systems standards to facilitate the integration of quality, environmental and safety management systems by organizations, should they wish to do so.

NOTE 2 BS OHSAS 18001^[Z] is the internationally recognized assessment specification for occupational health and safety management systems. It was developed with the assistance of a range of national standardization bodies, regulatory and certification bodies, and trade bodies to address a gap where no third-party certifiable International Standard currently exists. It is planned that the future ISO 45001 will replace BS OHSAS 18001.

5 Concepts and processes

5.1 General

In order to properly address health and safety at work, it is necessary to

- identify hazards, i.e. anything with the potential to cause harm, (this can include substances or machines, methods of work and other aspects of the work organization),
- identify and quantify risks, i.e. the likelihood that a particular hazard might cause harm to those exposed to it and the consequences for them (risk therefore reflects both the likelihood that harm will occur and its severity),
- carry out a risk assessment (a careful examination of what could cause harm to people), to determine whether sufficient has been done (precautions taken) to manage the risks or what further needs to be done to prevent harm, and
- manage the risks by assessing them, putting sensible health and safety measures in place to control them and then making sure they work in practice (a process usually termed “risk management”).

5.2 Risk assessment

A risk assessment should be carried out by an appropriately qualified person before any sampling or other investigation activities, including a site reconnaissance, are carried out as part of a preliminary investigation. This is particularly important on former industrial sites and waste disposal sites. If site reconnaissance forms part of the preliminary investigation, the risk assessment should be based on the results of the desk study. It might be possible to refine the assessment once the preliminary investigation is completed, and it should be kept under review as the investigation proceeds.

Risk assessment typically involves:

- identification of the hazards;
- deciding who or what might be harmed and how;
- evaluating the risks and deciding on precautions;
- recording findings and implementing them;
- reviewing the risk assessment frequently (e.g. daily) and amending it as necessary.

The risk assessment should take into account that site investigation workers are typically:

- exposed to weather extremes;
- exposed to physical hazards;
- sometimes exposed to other potential hazardous substances such as cement and adhesives;
- are often peripatetic (move between sites and possibly employers).

ISO 18400-103:2017(E)

The risk assessment record should show:

- a proper check of the hazards was made;
- that those who might be affected have been identified;
- all the obvious significant hazards have been dealt with, taking into account the number of people who could be involved;
- the control measures are acceptable, and the remaining risk is minimised;
- staff or their representatives were involved in the process;
- who carried out the risk assessment and their qualifications for this task.

NOTE 1 A common method for evaluating risks involves working out a risk level by categorizing the likelihood of the harm and the potential severity of harm and then plotting these two risk-determining factors against each other in a risk matrix (see [Table 1](#)). The risk level determines which risks should be tackled first.

Using a matrix can be very helpful for prioritizing actions. It is suitable for very many assessments but particularly lends itself to more complex situations. However, it does require a fair degree of expertise and experience to judge the likelihood of harm accurately. Getting this wrong could result in applying unnecessary controls or failing to take important ones. People working full time in health and safety often use a version of this method. It provides a good alternative to the “good practice” approach, i.e. adopting practices that are widely recognized and set out in authoritative guidance.

Table 1 — Risk matrix

		Potential severity of harm		
		Slightly harmful 1	Harmful 2	Extremely harmful 3
Likelihood of harm occurring	Highly unlikely 1	Trivial 1	Tolerable 2	Moderate 3
	Unlikely 2	Tolerable 2	Moderate 4	Substantial 6
	Likely 3	Moderate 3	Substantial 6	Intolerable 9

NOTE 2 An example of a risk assessment for driven probe boring (window/windowless drilling) is provided in [Annex C](#).

5.3 Risk management

In order to achieve safe working conditions (i.e. to reduce risks to an acceptable minimum), the employing organizations should adopt formal “policies” and operating frameworks requiring (see also [6.1](#) and [6.2](#)):

- identification of hazards and evaluation of risks;
- avoidance of risks wherever possible;
- failing this, control of the risks through adoption of appropriate operating procedures;
- failing this, or in addition, the protection of individuals against unavoidable risks.

Employers should provide training and keep records of procedures adopted and of any incidents. It might be necessary to establish health screening and surveillance programmes.

In order that appropriate risk reduction and management procedures can be identified on a site-specific basis, those managing site investigations should:

- identify hazards;
- identify under what circumstances the hazards might present a risk;
- quantify the actual risks.

In relation to contaminated sites, the importance of a preliminary investigation (see ISO 18400-202¹⁾) for identification of hazards from contamination and physically hazardous conditions is emphasized.

5.4 Identifying hazards

As indicated in 5.2, potential and actual hazards should be identified taking into account:

- the history of the site as established in the preliminary investigation (see ISO 18400-202¹⁾);
- the activities to be carried out on the site (e.g. exploratory and sampling techniques);
- the nature of the site (e.g. agricultural land, industrial land, forest);
- topography and other physical aspects such as waterlogging;
- weather/climate.

NOTE [Clause 6](#) and [Annex B](#) provide information on the hazards that could be encountered in a variety of situations including on agricultural and contaminated sites.

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6 Safety precautions — General aspects

SIST ISO 18400-103:2018

6.1 Safety policy

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Any organization involved in site investigations and sampling should have a safety policy which sets out the requirements for safe working. Adherence to the policy should be part of the conditions of employment of all personnel. The policy should:

- emphasize the need for alertness and vigilance on the part of site personnel to protect themselves from hazards during investigation and sampling;
- emphasize the requirement to follow standard operating procedures where these exist;
- describe the responsibilities of each member of the investigation team, including the responsibilities to any subcontracted personnel and to the general public;
- require competency to be demonstrated and the evidence for this to be recorded;
- include a mandatory ban on smoking, eating or drinking while carrying out a sampling exercise or other investigation on-site.

The policy should be supported by standard procedures setting out the requirements for safe working in general, and in specific locations such as confined spaces. These standard procedures should include the provision and use of protective clothing and equipment and the minimum number of personnel that should be involved in site work. The standard procedures should also specify the requirements for contacting local emergency services, methods of communication and methods of washing and decontamination.

NOTE Employing organisations (i.e. clients) sometimes enforce their own safety policies through contractual requirements on the organization(s) carrying out the investigation.

1) Under preparation.