SLOVENSKI STANDARD
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Kakovost tal - Vzorčenje - 104. del: Strategije

Soil quality - Sampling - Part 104: Strategies

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Qualité du sol - Échantillonnage - Partie 104: Stratégies

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ICS:

13.080.05	Preiskava tal na splošno	Examination of soils in general

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Part 104:
Strategies

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Foreword

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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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The committee responsible for this document is ISO/ TC 190, *Soil quality*, Subcommittee SC 2, *Sampling.*

This first edition cancels and replaces together with ISO 18400-101 and ISO 18400-107 the first edition of ISO 10381-1:2002, and together with ISO 18400-202 and ISO 18400-203 the first edition of ISO 10381-4:2003, and together with ISO 18400-202 and ISO 18400-203 the first edition of ISO 10381-5:2005, and together with ISO 18400-102, ISO 18400-105 and ISO 18400-206 the second edition of ISO 10381-6:2009, and at last together with ISO 18400-102 the first edition of ISO 10381-8:2006. All mentioned parts of the ISO 10381 series have been technically and structurally revised. The new ISO 18400 series is based on a modular structure and cannot be compared to the ISO 10381 series clause by clause.

ISO 18400 consists of the following parts, under the general title *Soil quality — Sampling*:

— *Part 100: Umbrella*

— *Part 101: Framework for the preparation and application of a sampling plan*

— *Part 102: Selection and application of sampling techniques*

— *Part 103: Safety*

— *Part 104: Strategies* (under preparation)

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— *Part 105: Packaging, transport, storage and preservation of samples*

— *Part 106: Quality control and quality assurance*

— *Part 107: Recording and reporting*

— *Part 201: Physical pretreatment in the field*

— *Part 202: Preliminary investigations* (under preparation)

— *Part 203: Investigation of potentially contaminated sites* (under preparation)

— *Part 204: Guidance on sampling of soil gas* (under preparation)

— *Part 205: Guidance on the procedure for investigation of natural, near-natural and cultivated sites* (under preparation)

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Introduction

This standard is part of a series of sampling standards for soil (the role/position of the individual standards within the total investigation programme is shown in Figure 1). This standard provides guidance on the development of site investigation strategies in general (more specific guidance is given in other standards) and of sampling strategies (e.g. what to sample, where to sample (locations and depths) and the types of samples to take) taking into account the need to obtain representative samples and to have regard to relevant statistical principles.

Soils (and other soil materials) are composed of a mixture of mineral particles, organic matter, water, air (soil gas) and living organisms. In the case of some contaminated soils, a non-aqueous liquid phase may be present. The solid matrix (phase), consists of particles of different size, shape and physical and chemical properties. The aim when carrying out soil sampling is usually to obtain sufficiently representative samples that can be used to characterise the properties of the whole soil entity (e.g. in situ soil in the form of a volume or horizon, or surface deposit such as a stockpile) or the portion considered relevant to the objectives of the investigation (e.g. <0.1 mm fraction for exposure assessment via hand-to-mouth activity). The properties of discrete entities such as individual soil particles are not addressed. As the soil as a whole cannot be analysed, soil samples are taken instead. The assumption that the results of these investigations on samples represent the total soil volume of interest is always an approximation, the reliability of which depends on additional information about the soil, the site and use of an appropriate sampling strategy. In other words, the sampling strategy should guarantee that together with additional information (on site observations, background information, previous investigation results etc.) the results for the samples analysed allow a model to be developed of relevant properties of the soil volume of interest to a sufficiently reliable degree, in accordance with the investigation objectives.

Whatever the purpose of the investigation, a sound conceptual site model is required. Every property of a soil or soil material is a result of their dynamic development influenced by natural and man-induced processes such as weathering, leaching, dislocation, contamination, and many others. Without considering this the results of any investigation of samples cannot be interpreted and evaluated properly. When spatial variability of soil properties (including contamination) is of particular interest, the conceptual site model includes what is known, or believed to be known, about the processes that led to the anticipated spatial distribution of properties.

The sampling strategy, especially when average properties are of interest, is preferably based on statistical methods, as far as practical and appropriate.

Having first defined key elements such as involved parties, objectives, properties of interest, phase of the investigation, background and site information, as well as health and safety aspects, a sampling strategy is developed that can form the basis of a sampling plan in accordance with ISO 18400-101 (the sampling plan covers a number of practical issues as well as the sampling strategy).

The appropriate sampling strategy in any particular case depends on:

— the objectives of the investigation;

— the special situation and characteristics of the material to be sampled;

— the properties of interest; and

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— the required degree of precision and reliability of the results.

Many other factors can also influence the design of the sampling strategy including:

— accessibility of the site as well as the sampled material;

— financial, personnel, and technical resources;

— weather conditions;

— the time schedule/frame; and

— legal/environmental restrictions.

Following the definition of the sampling approach, the appropriate sampling techniques are selected following the guidance in ISO 18400-102 having regard to health and safety (ISO 18400-103) and various practical considerations. The decisions made regarding sampling techniques form part of the sampling plan.
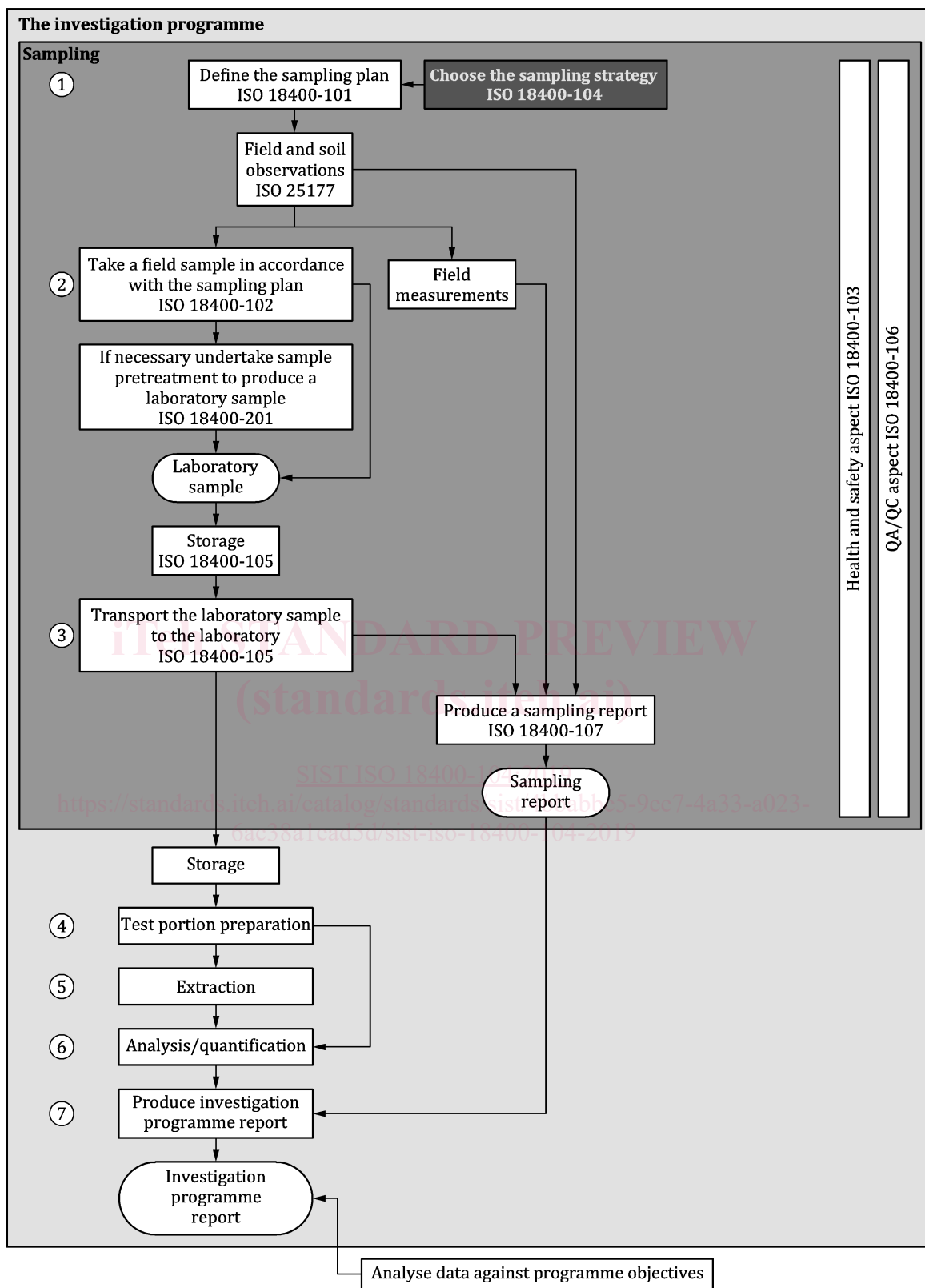
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Figure 1 — Links between the essential elements of an investigation programme

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

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