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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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/TS 22475-2 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 341, *Geotechnical investigation and testing*, in collaboration with Technical Committee ISO/TC 182, *Geotechnics*, Subcommittee SC 1, *Geotechnical investigation and testing*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO/TS 22475 consists of the following parts, under the general title *Geotechnical investigation and testing — Sampling methods and groundwater measurements*:

- *Part 1: Technical principles for execution*
- *Part 2: Qualification criteria for enterprises and personnel* (Technical Specification)
- *Part 3: Conformity assessment of enterprises and personnel by third party* (Technical Specification)

## Introduction

ISO 22475-1 specifies the technical principles for the execution of sampling and groundwater measurements.

The quality of these services can be proven by:

- 1) a declaration of conformity by a contractor (first party control);
- 2) a declaration of conformity by a client (second party control);
- 3) a declaration of conformity by a conformity assessment body (third party control).

Every enterprise or individual may decide if and how they will prove the fulfilment of the technically related criteria, by first, second or third party control, because no part of ISO 22475 requires such a declaration.

ISO/TS 22475-2 specifies the qualification criteria for enterprises and personnel that perform sampling and groundwater measurements according to ISO 22475-1.

The conformity assessment by third party control can be made according to the technical principles for execution of sampling and groundwater measurements according to ISO 22475-1, as indicated in ISO/TS 22475-2, and the conformity assessment procedure given in ISO/TS 22475-3.

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# Geotechnical investigation and testing — Sampling methods and groundwater measurements —

## Part 2: Qualification criteria for enterprises and personnel

### 1 Scope

This document specifies the qualification criteria for an enterprise and personnel performing sampling and groundwater measurement services so that all have the appropriate experience, knowledge and qualifications as well as the correct equipment for and groundwater measurements for the task to be carried out according to ISO 22475-1.

### 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 14688-1, *Geotechnical investigation and testing — Identification and classification of soil — Part 1: Identification and description*

ISO 14689-1, *Geotechnical investigation and testing — Identification and classification of rock — Part 1: Identification and description*

ISO 22475-1, *Geotechnical investigation and testing — Sampling methods and groundwater measurements — Part 1: Technical principles for execution*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22475-1 and the following apply.

#### 3.1

##### **qualified operator**

person who has documented competence to perform specified parts of sampling and/or groundwater measurements according to ISO 22475-1

#### 3.2

##### **responsible expert**

person who has documented competence and is responsible for the execution of specified parts of sampling and/or groundwater measurements according to ISO 22475-1 and checking the quality of the performance

#### 3.3

##### **enterprise**

organization that carries out specified parts of sampling and/or groundwater measurements according to ISO 22475-1

## 4 Requirements

### 4.1 Requirements for the enterprise

**4.1.1** The enterprise carrying out sampling and/or groundwater measurements according to ISO 22475-1 shall be able to demonstrate adequate competence and have:

- a) experienced personnel and facilities to manage and to perform specified types of services;
- b) items of equipment following ISO 22475-1;
- c) a health and safety system;
- d) a quality assurance system.

**4.1.2** The enterprise shall ensure that all specified equipment complies with the appropriate technical specifications, is correctly maintained, calibrated and used according to specifications and operating manuals.

**4.1.3** A qualified operator shall be continuously present and be responsible for the performance of sampling by drilling installations, measurements and recording at each drill rig.

**4.1.4** The enterprise shall appoint a responsible expert for each project who also signs the report.

**4.1.5** The enterprise shall comply with the actual bylaws, health and safety regulations and technical rules for the corresponding field of activity and follow them.

**4.1.6** The enterprise shall be covered for public liability.

### 4.2 Personnel requirements

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#### 4.2.1 General

**4.2.1.1** The enterprise shall have a minimum of one responsible expert and qualified operators in adequate numbers appointed for each project of specified parts of sampling and/or groundwater measurement.

**4.2.1.2** The enterprise shall provide vocational training of its personnel on a regular basis and maintain records of this training.

**4.2.1.3** The qualification of external personnel and sub-contractors shall meet the same criteria and shall be verified by the enterprise.

#### 4.2.2 Qualified operator

**4.2.2.1** The competence of a qualified operator shall be documented (e.g. according to ISO/TS 22475-3 or other assessment procedures). Proof of suitable work experience of at least three years or more depending on the sampling methods in an enterprise that performs specified parts of sampling and/or groundwater measurement services according to ISO 22475-1 is required.

**4.2.2.2** The qualified operator shall have documented competence regarding the following:

- a) basic knowledge of the purpose of geotechnical ground investigation, of geological, soil and rock mechanical and hydrogeological fundamental principles;
- b) specified parts of sampling and/or groundwater measurements including borehole back filling, handling, transport and storage of samples according to ISO 22475-1;
- c) completion of records according to ISO 22475-1;



- d) a preliminary identification and description of soil and/or rock in each sample according to ISO 14688-1 and ISO 14689-1 during the sampling process;
- e) the relevant health, safety and environmental regulations;
- f) the functioning, safe operation and maintenance of the equipment (including field checks);
- g) the quality assurance system.

#### 4.2.3 Responsible expert

4.2.3.1 The responsible expert shall have the following documented competence:

- a) either college or university degree of a relevant subject and proof of suitable work experience of at least three years in an enterprise that performs specified parts of sampling and/or groundwater measurement according to ISO 22475-1;
- b) or a completed vocational training of a relevant subject and proof of suitable work experience of at least five years in an enterprise that performs specified parts of sampling and/or groundwater measurement according to ISO 22475-1.

4.2.3.2 The responsible expert shall have sufficient proven knowledge concerning

- a) the appropriate laws, health and safety regulations, technical rules and standards;
- b) the purpose of geotechnical ground investigation, about geological, soil and/or rock mechanical and hydrogeological principles;
- c) appropriate parts of sampling and/or groundwater measurements according to ISO 22475-1;
- d) reporting sampling and/or groundwater measurements according to ISO 22475-1;
- e) the identification and description of soil and rock in each sample according to ISO 14688-1 and ISO 14689-1 during the sampling process, if relevant;
- f) the quality assurance system.

4.2.3.3 The responsible expert shall be able

- a) to understand the aim of the investigation programme;
- b) to supervise the work of the qualified operator;
- c) to ensure the completeness and quality of the report according to ISO 22475-1, especially divergences influencing the results of the investigation, e.g. sample quality;
- d) to call for additional expertise if required.